(No Model.) 4 Sheets—Sheet 1.

E. R. STASCH.

MACHINE FOR CORRUGATING AND EDGING SHEET METAL.

No. 382,277. Patented May 1, 1888.

Fig. 1.

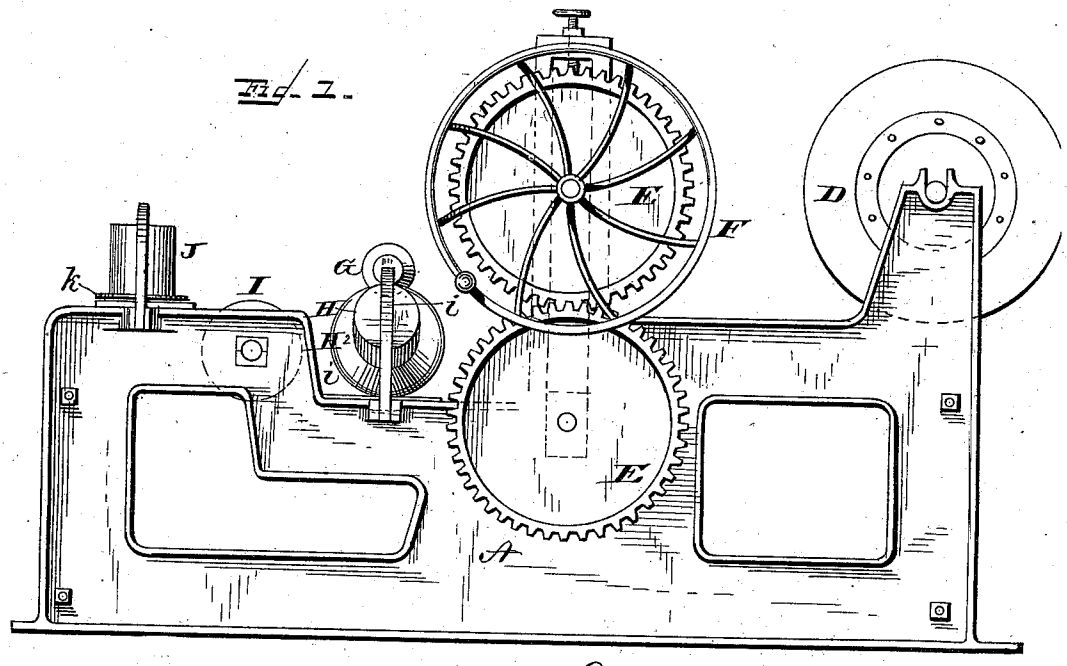
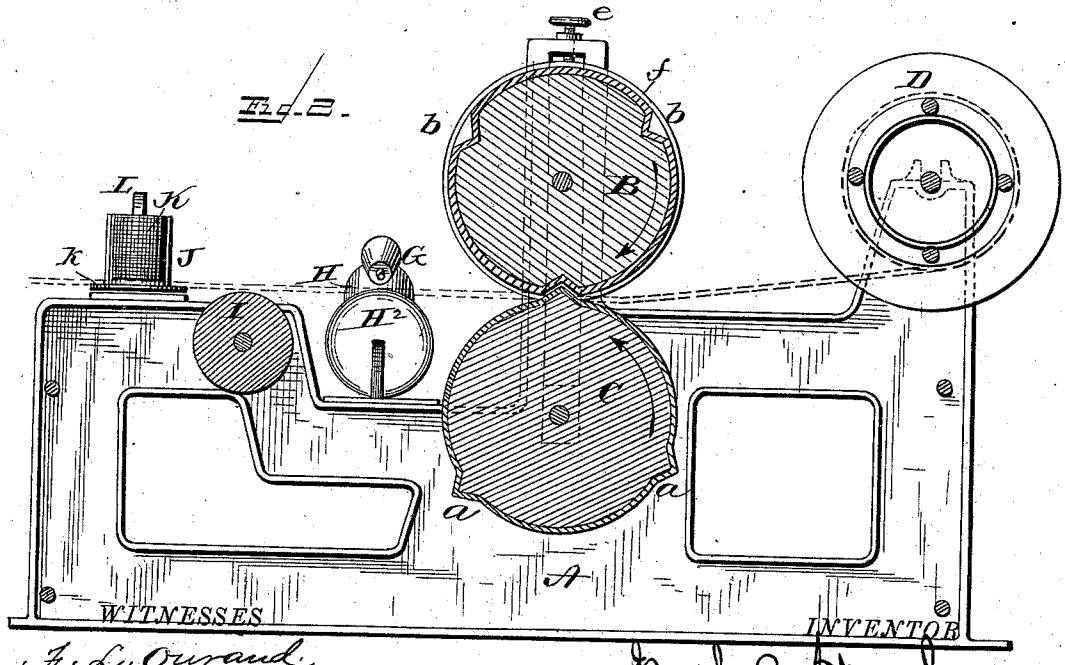


Fig. 2.



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(No Model.) 4 Sheets—Sheet 2.

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Fig. 3.

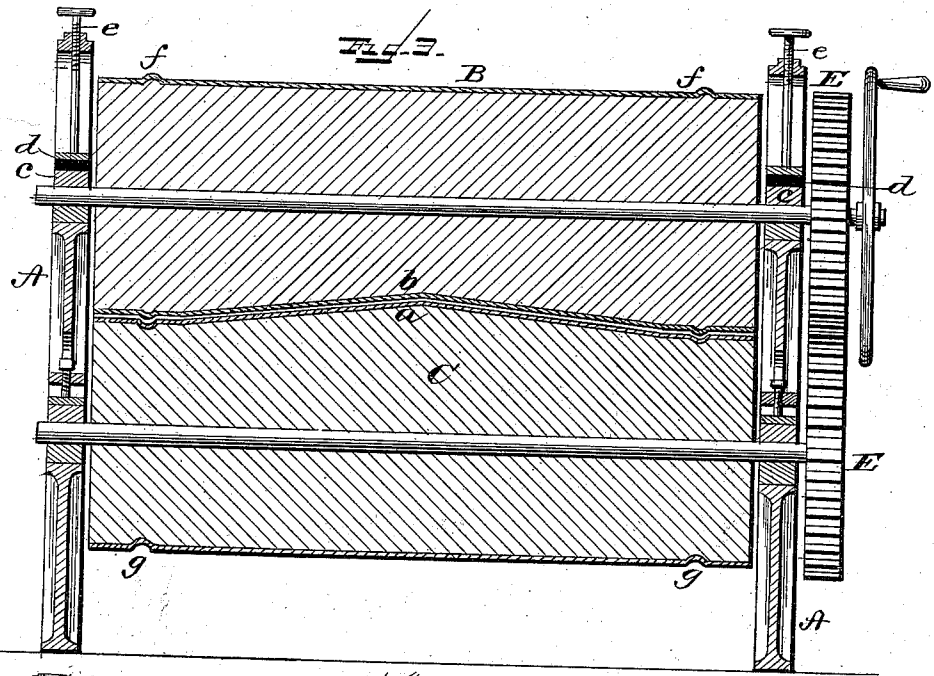
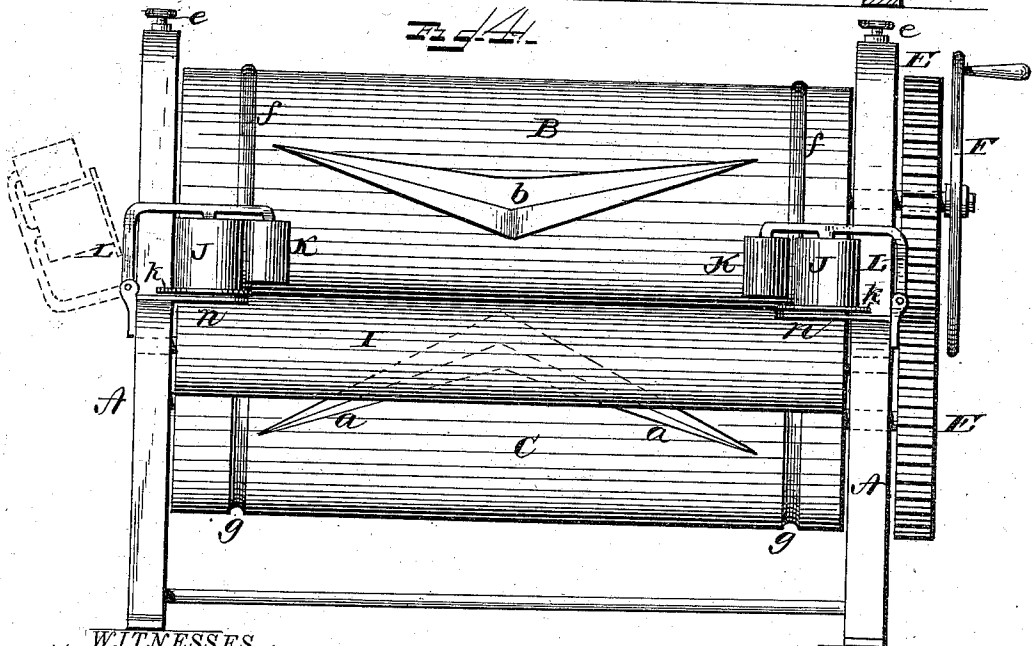


Fig. 4.



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Fig. 5.

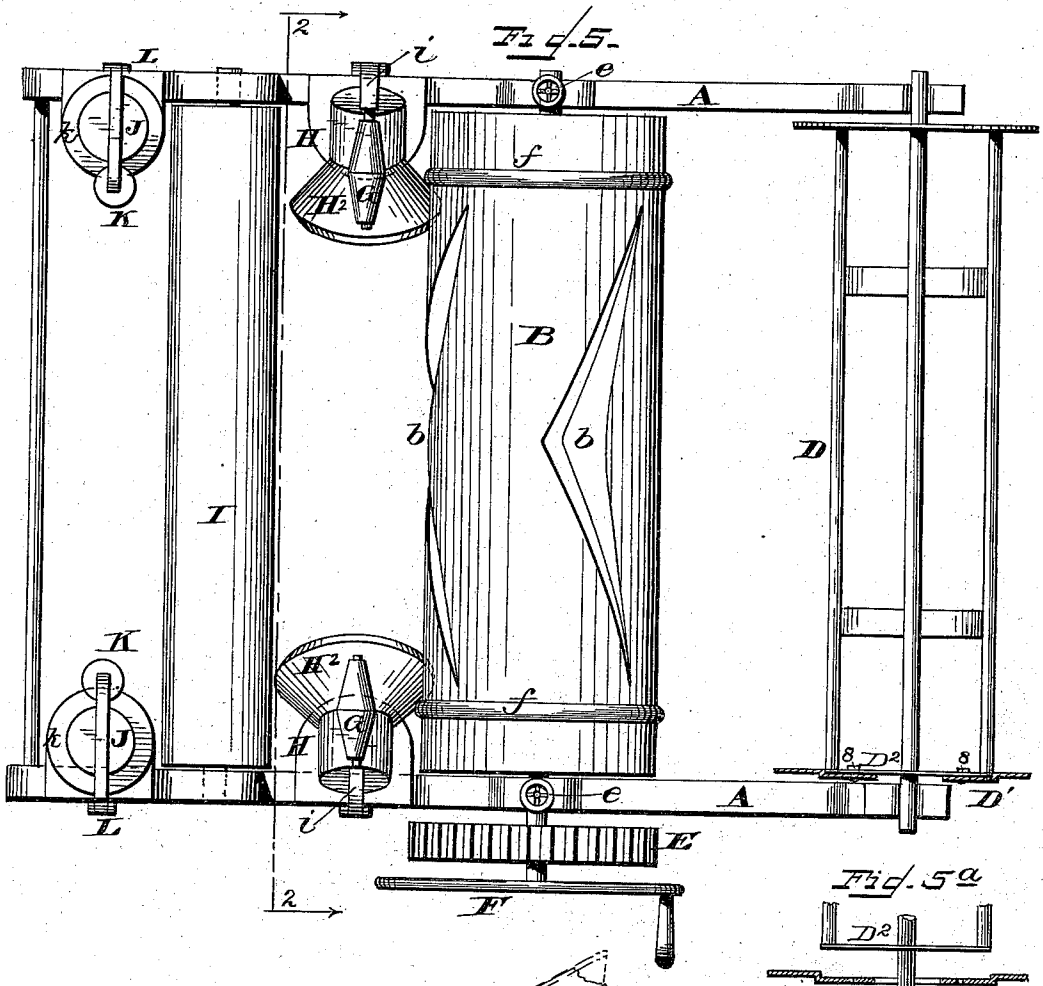
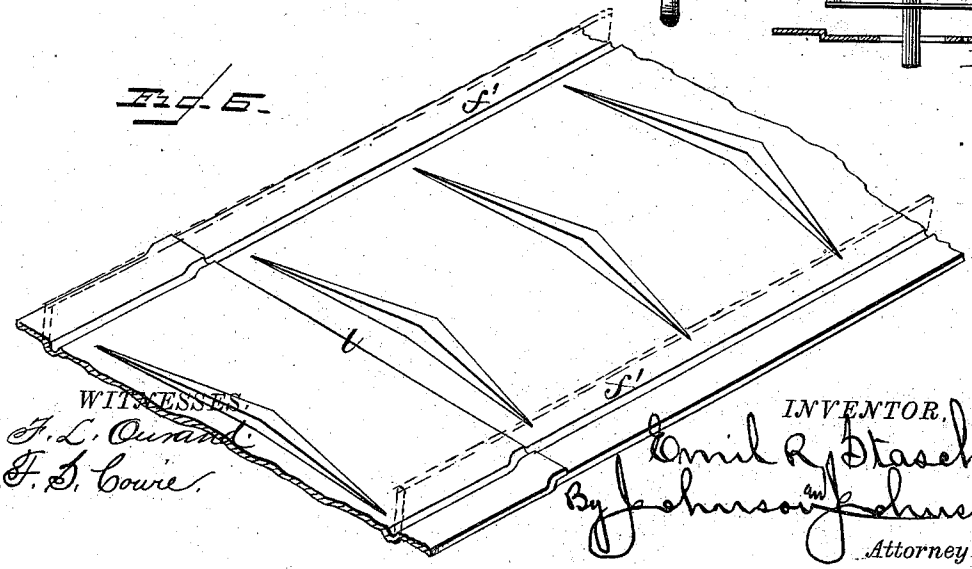


Fig. 5a

Fig. 6.



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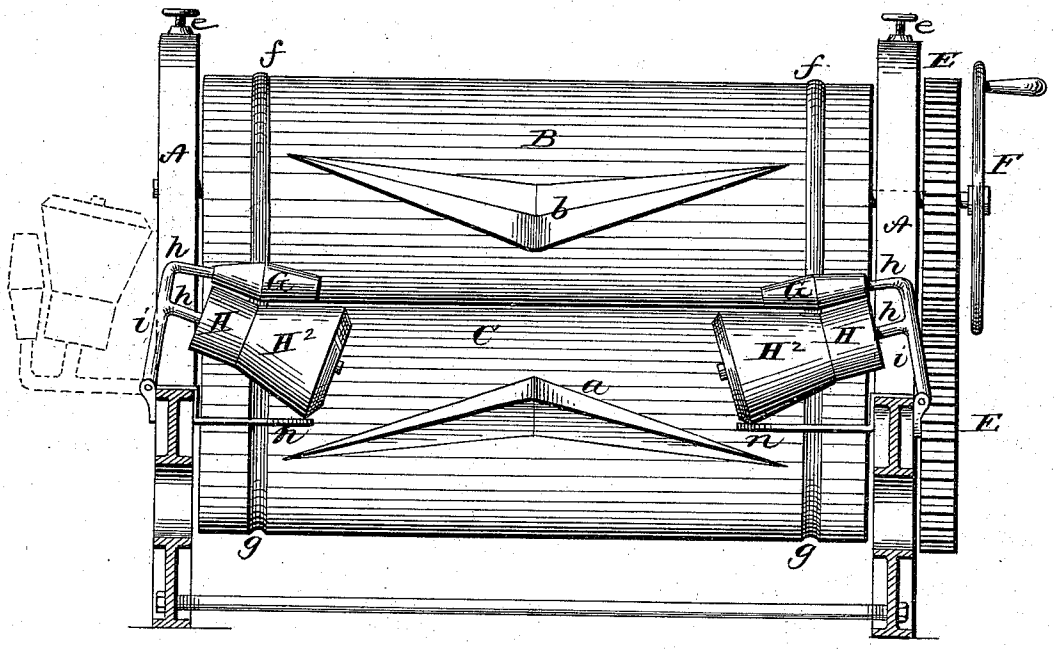
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MACHINE FOR CORRUGATING AND EDGING SHEET METAL.

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Fig. 7.



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UNITED STATES PATENT OFFICE.

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MACHINE FOR CORRUGATING AND EDGING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 382,277, dated May 1, 1888.

Application filed January 20, 1888. Serial No. 261,388. (No model.)

To all whom it may concern:

Be it known that I, EMIL R. STASCH, a citizen of the United States, residing at Corning, in Steuben county, and State of New York, have invented new and useful Improvements in Machines for Corrugating and Edging Sheet Metal, of which the following is a specification.

Sheet-metal roofing, when laid and seamed, has a fullness or surface looseness upon the roof-boards, which is the cause of more or less noise, like a cracking sound produced by persons walking over it, due to the effects of expansion and contraction, and it is, moreover, liable to rattle from wind getting under it.

My improvement is designed to avoid these objections, to stiffen and brace the sheet-roofing, and to give it a firm flat seating upon the boards, so that the seamed sheets will have a tightness that will prevent all cracking and rattling noise when properly secured. For this purpose I have produced a machine by which the sheets which are to be seamed together for the roof are formed with corrugations within the body of the sheet, as will be hereinafter described, so that when the sheets of a longitudinal strip are soldered together, edged, and joined by the seaming operation they will be stiffened and braced in lines crosswise to the lines of the seams, and thus cause the roofing to lie flat and firm upon the boards, the corrugations serving to take up the fullness not only of each sheet, but of the connected sheets throughout the roof.

The sheets can be corrugated separately for what is known as "flat seaming;" but for vertical seaming they must be soldered together before being corrugated, because in roofing a house the sheets are soldered together at the shop in lengths and taken in rolls to the place for use when the work is to be done with vertical seaming. In such case the operations of corrugating and of edging for the seam are done in the same machine by passing the soldered length of sheets through it in one operation.

My invention therefore embraces a machine adapted for corrugating single roofing-sheets, and for corrugating and edging at one operation the soldered length of sheet for roofing. I prefer for this purpose to construct the machine with edging devices adapted for adjustment into or out of use, as may be desired, according to the work to be done without interfering with the operation of corrugation, so that one machine will be suited for both kinds of work. In the accompanying drawings I have illustrated such a machine, which, when constructed for use, will be portable so as to be taken by the tinner to his work.

Referring to the drawings, Figure 1 represents a side elevation of my corrugating-machine. Fig. 2 is a vertical longitudinal section of the same, the soldered length of sheet being shown in dotted lines as it is fed from the reel to the corrugating-rolls. Fig. 3 is a cross-section of the machine, taken through the axes of the corrugating-rolls. Fig. 4 is a rear view of the machine. Fig. 5 is a top view of the machine. Fig. 6 represents a portion of two sheets soldered together and corrugated; and Fig. 7 is a cross section of the machine, taken in the line 2 2 of Fig. 5. Fig. 5ª shows a detail of the detachable head of the reel.

The machine will weigh about thirty-five pounds, the operating parts being mounted in a suitable frame so as to permit the sheet to be fed at one end to the corrugating-rolls, and to be edged, if desired, as it leaves them at the other end of the machine.

Within suitable bearings of the side frames, A, and at about the middle of their length, are mounted, crosswise, rolls B and C, one vertically above the other, and preferably placed so that their meeting surfaces will be about on a level with the top of the frame. These rolls are provided with registering surface projections and recesses adapted to corrugate a sheet when passed between them. I prefer to form the surface projections *a* upon the lower roll, and to dispose them equidistant, as shown in Fig. 2.

The projections shown are of a very wide V shape, having its arms tapering to points toward the ends of the cylinder, as seen in Figs. 4 and 5. The rib-arms, however, do not extend to the end of the cylinder, but are of sufficient length only to form the corrugations within the body of the sheet, as seen in Fig. 6, so that such corrugations will not extend to the edges of the sheet. The greatest surface projection of these ribs is at the angle of the V, and from this point such projection grad-

ually decreases to the ends of the arms, so that the corrugations in the sheet will gradually terminate at the surface thereof. The upper roll has recesses *b*, corresponding in depth and form to the surface projections of the lower roll and registering with them. The number of these surface registering-roll projections and recesses may be two or more, (three being shown,) and they will produce a corresponding number of corrugations in the sheet, as shown. The upper corrugated roll is mounted in sliding boxes *c*, held down by the pressure of springs *d* and screws *e*, whereby the upper roller is free to yield, for a purpose which I will presently describe.

The upper roll is formed near its ends with circumferential ribs *f*, and the lower roll has corresponding grooves *g*, which together serve to groove or indent the sheet while being corrugated sufficiently to start the line at which the sheet is edged or bent for the seam outside of the corrugations.

Provision is made for removably mounting a reel, D, upon the front end of the machine, to receive a roll of tin, so that it may be fed therefrom to the corrugating-rolls, as shown in Fig. 2. To permit the roll to be slipped upon the reel, one of its heads, D′, is made removable, as shown in Fig. 5, so as to be taken off when the roll of tin is to be slipped over and upon the reel-rods, the reel for this purpose being removed from its bearings, which may be of any construction to permit of such removal. Referring to this removable head D′ of the reel, (shown in detail, Fig. 5ª,) such removal may be made by making the head D′ like a plate-ring, and securing it by screws 8 to the outer face of a head, D^2, fixed to and connecting the ends of the reel-arm, so that by taking the screws 8 out the head is free to be removed. The roll of tin can then be slipped upon the reel-arms, over the head D^2, and the ring-head again secured in place. The reel-heads simply serve to hold the sheet-roll, so that it will unwind true to the corrugating-rolls.

The rolls are geared together by equal gears E E, and the top roll-shaft has a fly-wheel, F, provided with a crank by which to operate the rolls, the speed of which being equal seize and feed the sheet between them in corrugating it. In corrugating the soldered length of sheets provision is made in the machine for edging the sheets at the same time, so that they may be seamed together in laying the roof. I prefer, however, to make such provision capable of non-use, so that the machine may be used for corrugating the sheets only—as, for instance, when they are to be used for flat seams. This edging of the sheet is effected gradually by rolls arranged in two or more pairs on each side of the machine in positions to receive the edges of the sheet and bend and turn them up as the sheet leaves the corrugating-rolls. For this purpose one set of rolls, G H H^2, is formed to commence the bending of the sheet at its edges as it leaves the corrugating rolls, while the other set of rolls at the end of the machine is formed to complete the edging of the sheet. Of the first set of rolls the upper roll, G, of each pair is formed of two truncate cones joined at their bases, while the lower roll of each pair has a cylindrical part, H, joining a truncate part, H^2, at its truncate apex, so that this latter part stands inward. Each pair of these rolls is mounted on bearing-arms *h h* of brackets *i*, suitably supported upon the side frames, and the relation of these rolls is such that the edges of the sheet will pass between them as it emerges from the corrugating-rolls. The rolls for this purpose, like the corrugating-rolls, are supported in separated relation, so that the joining of the cones of the rolls G will stand in line with the starting-bend *f′* in the sheet, (see Fig. 6,) and in line with the joining of the lower roll parts, H H^2, in such manner as to bring the surface of the inner cone part of the upper roll and the surface of the inner cone part of the lower roll in a horizontal plane coincident with the meeting surfaces of the corrugating rolls corresponding with the unbent part of the sheet. The outer cone part of the upper roll and the outer cylindrical part of the lower roll will stand at their meeting surfaces at an upward angle sufficient to start the edging of the sheet and permit such edge-bent part to enter and be forced between rolls which bring such bend to a right angle, as shown in Fig. 4, in completing the edging of the sheet.

The sheet in passing from the rolls will strike between the rolls which start the edging bend, so as to bring the grooves *f′*, made in the sheet by the ribs and grooves of the corrugating rolls, at the angles between the planes of the rolls, so that the edges or flanges outlined by the corrugating rolls will be bent upward, as stated.

A roller, I, is journaled in the side frames in position to receive and support the sheet as it leaves the rolls G H and guide it to the edge-finishing rolls, which I will now describe. The rolls J and K are mounted in pairs upon vertical bearings of suitable brackets, L, secured to the side frames, the rolls being separated so as to permit the bent-edge part of the sheet to pass between them. The outer rolls of these pairs have flanges *k* on their lower ends, which serve to support the sheet as it passes between them and while it is being edged or turned up vertically at the edge, so that the sheet will pass out of the machine corrugated and edged, ready for seaming.

The several pairs of edging-rolls may be mounted so that they may be turned over with their brackets out of the way, as shown by dotted lines in Figs. 4 and 7, and thereby adapt the machine for corrugating single sheets for flat seaming. For this purpose I prefer to so hinge the brackets to the frame that they can be turned upward and outward, and when so used the reel is removed and the single sheet can then be corrugated and grooved along the edges. In this way the

machine is adapted for corrugating sheets that are soldered together for vertical seams, or for corrugating single sheets for flat seams.

In corrugating the soldered sheets the upper roller will yield to allow the soldered joint *l*, Fig. 6, to pass between the rolls. In this figure I have shown the sheets soldered together and the edging in dotted lines; but it will be understood that when the single sheets are corrugated they are not also edged. But of whatever form, these middle registering projections and recesses, they should act to take up the fullness of the sheet in every direction of the sheet. Therefore projections and recesses running in the line of the axes of the rolls only would be insufficient for the purpose of my invention, because such corrugations in the sheet would only take up the fullness in one direction—that is, in the length of the connected sheets, but not at right angles to such length, and the sheets would for this reason when laid be full and comparatively loose along their seam-connected edges. This is the difficulty my invention overcomes, by causing the corrugations in the sheet to stand obliquely to the lines of the seams, so as to draw the fullness of the sheet into the corrugations from the direction of the edges which are to be seamed and from the direction of the edges which are connected in the strip—that is, from the four directions. There is another advantage in the preferred form of these registering projections and recesses, and that is, the construction which gives the greatest depth to the corrugations along the middle of the sheet, and from this point the oblique arms of the projections gradually diminish and terminate in points at the surface, and thereby prevent the puckering or ridging of the metal along the seaming line at each edge. For this purpose the projections are made widest and of the greatest surface projection at the middle of the length of the roll, and from this point the arms taper or decrease both in width and surface projection, and terminate in points coincident with the surface of the roll, so that in effect the fullness of the sheet is concentrated at the middle or central line of the sheet-metal strip throughout its whole length.

The projections and recesses occupy a comparatively small portion of the surface of the rolls, leaving the balance unbroken to make contact with those portions of the sheet which are not acted upon by the registering parts of the rolls.

I am aware that it has been proposed to corrugate sheet metal so as to leave unbroken margins at the edges, which stand at right angles to the line of such corrugations, and in which both surfaces of the sheet are corrugated, so as to form projections and recesses alternating, making each surface with gutters or grooves below the latter separated by projections above the surface.

I am also aware that it has been proposed to form such corrugations both as to the grooves and as to the ridges in longitudinal serpentine or wavy lines of equal width and projection throughout their length, and therefore terminating above the unbroken surface of the sheet on both sides thereof. It would be impracticable, however, to use sheet-tin corrugated in this way for roofing, for the reason that its surface-gutters, standing at right angles to the seams, would collect and hold water and dirt over the entire surface of the roof between the seams, whereas by my improvement the corrugations or ridges are formed in the upper side only of the sheet with intervening unbroken surface, and with the corrugations so formed as to shed the water and prevent the collection of dirt, and for this purpose the hollow sides of the corrugations stand downward, so as to permit the water to run off around the upper inclined sides of the corrugations. This is an advantage not possible in parallel wavy corrugations forming alternate surface ridges and gutters. It is obvious, therefore, that rolls having their surfaces broken by alternate projections and recesses above and below the surface, and having such corrugations formed in longitudinal parallel serpentine or wavy lines, are not adapted to carry out my invention.

The machine will save time and labor in seaming the roof, and may be readily operated by hand. The edging may be done on a separate machine; but when the edging-rolls are used in the same machine with the corrugating-rolls, they are firmly supported by their brackets and upon projections *n n* of the frame. When the edging-rolls are not adapted to be turned over out of the way, they may be supported in any suitable way.

I claim—

1. In a machine having rolls for corrugating sheet metal for roofing, one of said rolls having circumferential ribs near its ends, and surface projections of angular or V form disposed at suitable distances apart between the said ribs, the other of said rolls having registering recesses, the arms of said projections tapering obliquely toward said circumferential ribs and terminating in points coincident with the surface of the roll, substantially as herein set forth.

2. In a machine for corrugating sheet metal, coacting rolls, one of which has surface projections of angular or V form, the other of said rolls having registering recesses, the said surface projections having their greatest width and projection at the middle of the length of the rolls and tapering therefrom in arms which terminate in points coincident with the surface of the rolls, substantially as described, and for the purpose specified.

3. In a machine for corrugating metal sheets for roofing, the rolls B and C, having surface registering projections and recesses in the middle of their lengths, the projections terminating in wide V-shaped arms, substantially as described, and registering circumferential ribs and grooves between the ends of the rolls and the termini of the oblique arms, the surfaces

of the rolls between said registering parts being unbroken, substantially as described, for the purpose specified.

4. In a machine for corrugating and edging connected metal sheets for roofing, the combination of the rolls B and C, having surface registering projections and recesses in the middle of their lengths, the projections terminating in oblique arms, and registering circumferential ribs and grooves between the ends of the rolls and the ends of said surface projections, substantially as described, with rolls arranged in pairs and adapted to edge the connected sheets at the starting-lines made by the said circumferential ribs and grooves, whereby the strip is edged after it has been corrugated between such edge-starting lines.

5. The combination, in a sheet-metal corrugating and edging machine, of the rolls having surface registering projections and recesses and circumferential registering ribs and grooves, with preliminary edge-bending rolls having conical form and finishing edge-bending rolls having cylindrical form arranged to receive the sheet as it leaves the corrugating-rolls, substantially as described, for the purpose specified.

6. The combination of the corrugating-rolls having circumferential registering ribs and grooves near their ends, two pairs of bending-rolls registering with the ribs and grooves and consisting, respectively, each of an upper double-conical roll and a lower cylindro-conical roll, a guide-roller, and two pairs of vertically-journaled edging-rolls of cylindrical form registering with the conical rolls for corrugating and edging sheet metal, as described.

7. In a sheet-metal corrugating and edging machine, the combination, with the rolls B and C, having surface registering projections and recesses and circumferential ribs and grooves, of a reel and bending and edging rolls, arranged for operation substantially as described.

8. In a sheet-metal corrugating and edging machine, the combination of the lower roll, C, having V-shaped surface projections *a* and circumferential grooves *g*, and the upper roll having the V-shaped surface recesses *b* and the circumferential ribs *f*, with the preliminary edge-bending rolls G H H^2 and the finishing edging-rolls J and K, the said upper corrugating-roll having the capacity to yield in relation to the lower roll, substantially as described, for the purpose specified.

9. The combination, in a sheet-metal corrugating and edging machine, of the rolls B and C, having surface projections and recesses *a* and *b* and registering circumferential ribs and grooves near their ends, with bending and edging rolls arranged in pairs on each side of the frame and carried by brackets adapted to be turned over out of the way, substantially as described, for the purpose specified.

10. In a machine for corrugating metal sheets for roofing, the rolls B and C, having registering circumferential ribs and grooves near their ends and intermediate registering projections and recesses which stand in oblique lines on the surface in the length of the roll, the said projections having their greatest surface projection at the middle of the length of the roll and extending therefrom to gradually terminate flush with the surface of the roll, as and for the purpose stated.

11. In a machine for corrugating metal sheets for roofing, the rolls B and C, having registering surface projections and recesses, the said projections being made widest and of the greatest surface projection at the middle of the length of the roll, and decrease in width and in surface projection in oblique arms, terminating in points coincident with the surface of the roll, as and for the purpose stated.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

EMIL R STASCH.

Witnesses:
F. S. COWIE,
A. E. H. JOHNSON.