No. 819,484. PATENTED MAY 1, 1906.

H. E. WHITE.

MACHINE FOR EXPANDING METAL.

APPLICATION FILED JUNE 24, 1905.

3 SHEETS—SHEET 1.

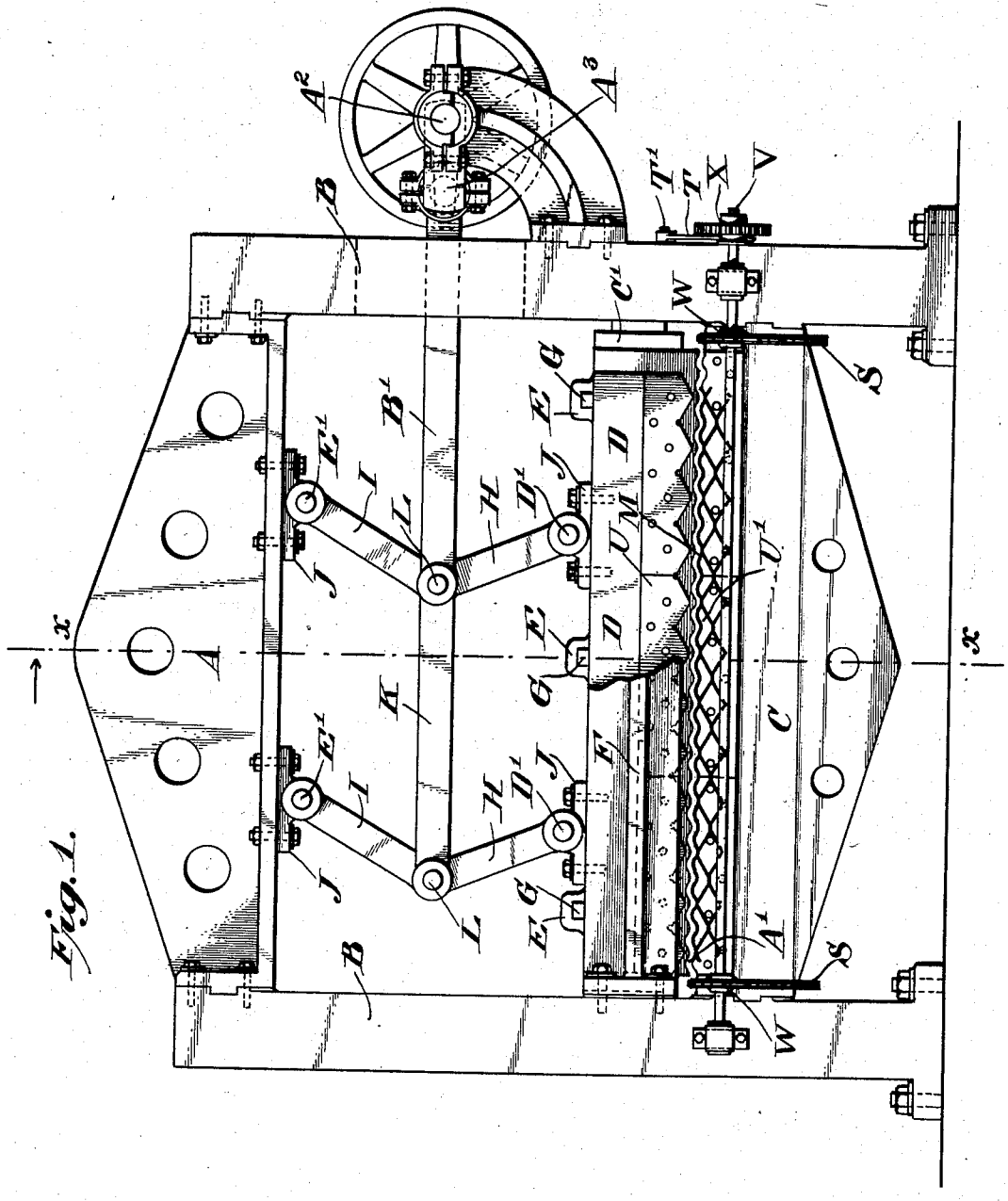


Fig. 1.

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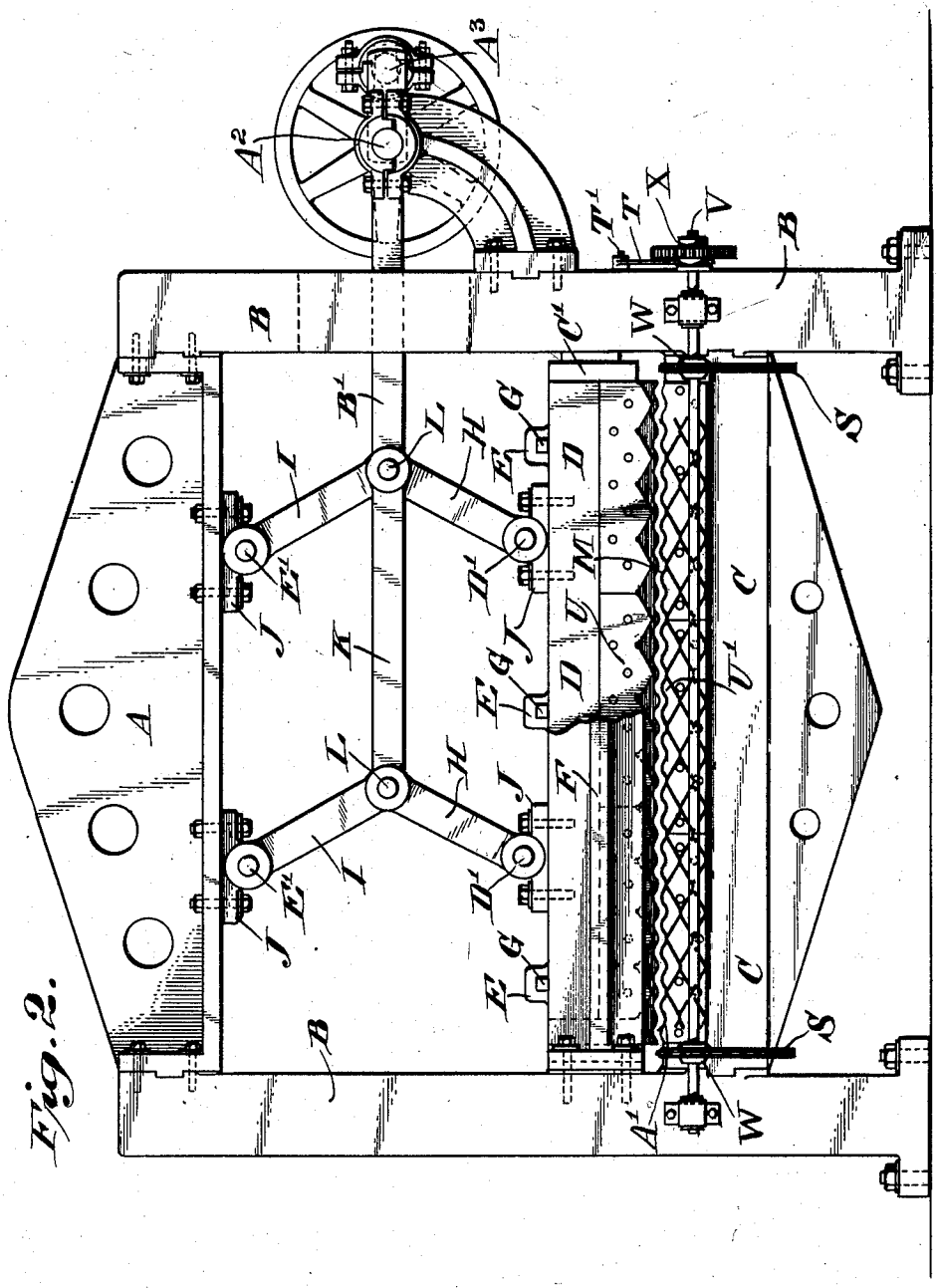


Fig. 2.

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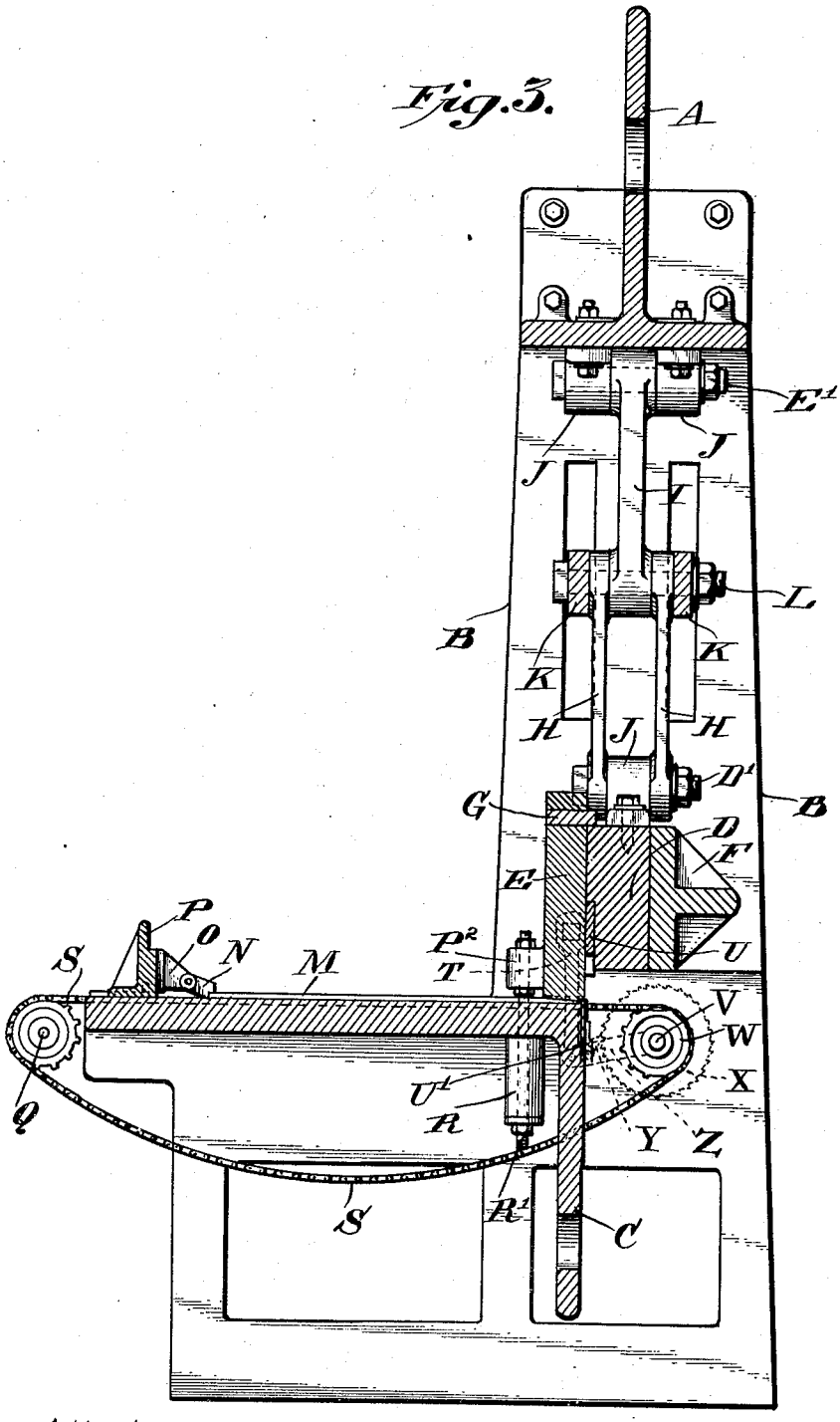
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3 SHEETS—SHEET 3.

Fig. 3.



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UNITED STATES PATENT OFFICE.

HERBERT E. WHITE, OF YOUNGSTOWN, OHIO, ASSIGNOR TO THE GENERAL FIREPROOFING COMPANY, OF YOUNGSTOWN, OHIO, A CORPORATION OF OHIO.

MACHINE FOR EXPANDING METAL.

No. 819,484. Specification of Letters Patent. Patented May 1, 1906.

Application filed June 24, 1905. Serial No. 266,754.

To all whom it may concern:

Be it known that I, HERBERT E. WHITE, a citizen of the United States, and a resident of Youngstown, Ohio, have invented certain new and useful Improvements in Machines for Making Expanded Metal, of which the following is a specification accompanied by drawings.

This invention relates to machines for making expanded metal for laths and other uses; and the objects of the invention are to improve upon such machines and enable a reticulated or mesh-like structure to be formed from a plate of corrugated metal instead of from a flat sheet of metal, as heretofore.

Further objects of the invention will hereinafter appear; and to these ends the invention consists of a machine for carrying out the above objects embodying the features of construction, combinations of elements, and arrangement of parts having the general mode of operation substantially as hereinafter fully described and claimed in this specification and shown in the accompanying drawings, in which—

Figure 1 is a front elevation of a machine embodying the invention after two strokes have been made. Fig. 2 is a similar view after the third stroke has been made. Fig. 3 is a vertical sectional elevation of the machine on the line *x x* of Fig. 1.

The prior methods of making expanded sheet metal have required either the slitting to be separate from the expanding or opening or a simultaneous slitting and bending of portions of the metal not in the same straight line of slits or the severe stretching of the metal itself to permit two sides of the mesh to be formed while the other two sides remain in the original plane of the flat sheet. The process carried out by the present invention seeks to obviate all this by providing in a preliminary step such a change in the form of the metal as will permit adequate provision for the displacing of the metal from the general plane of the sheet treated, so as to form part of the mesh without stretching the metal itself and without disturbing the portions of the mesh to be subsequently formed.

Briefly stated, my present way of treating the metal consists in first crimping, corrugating, or otherwise shortening the sheet so as to provide substantially for the formation of the meshes, as hereinafter explained, and then after such preliminary step to simultaneously cut and expand or open one row of half-meshes or part meshes after another in a single straight line along the sheet.

I have made a separate application for the above process, filed June 10, 1905, Serial No. 264,595, and the machine covered by the present application is illustrative of one suitable form of apparatus for carrying out the process.

I have found that one of the best ways of shortening the metal to afford the slack or margin requisite for the simultaneous cutting and expanding of the metal without material stretch is by corrugating the metal regularly in a direction at right angles to the slits that are to be formed. Preferably also the corrugations should be spaced to correspond one with each row of joints where the adjacent rows of strands are united. This will be clear from the portion of the expanded sheet shown in the machine in Fig. 2, wherein it will be seen that the hollows of the corrugations of the unexpanded sheet A′ are shown corresponding with the joints or points of union of the expanded portion. The degree of corrugation should be calculated so that the original length of the sheet before corrugation shall correspond with the final length of one strand as measured along its curves. The degree of corrugation or crimping is therefore dependent on the degree which it is desired to open the slits to form the meshes. The lineal length measured along two corrugations should correspond to the length along the edge of one cutter. The corrugated or shortened sheet will correspond in length as measured across the corrugations with the final length of the expanded sheet. According to this process there is no necessity of stretching the metal.

Referring to the drawings, the framework of the machine consists of the end housings B, the top yoke A, and the lower yoke C, which latter part also serves as a feed-table and lower-blade carrier, the lower or corrugated blades U′ being suitably bolted thereto.

M represents the sheet of corrugated metal which is to be expanded, and suitable means

are provided for feeding the sheet forward and for expanding the same.

U represents the upper cutter-blades suitably carried by the ram D, which is adapted to be reciprocated vertically to cut and expand the metal and also shifted across the sheet to produce the requisite strands or reticulated meshwork.

The crank-shaft A^2 and crank A^3 actuate the parallel links K by means of the connecting-rod B', thereby imparting a reciprocating longitudinal motion to the links K, which in turn operate to make and break the pairs of toggle-links I and H, pivotally connected to the links K by the pins L. The links I and H are also pivotally connected to the housing A by pins E' and to the ram D by pins D'. The longitudinal motion imparted to the links K makes and breaks the toggle-acting joints described and produces a vertical reciprocating motion of the ram D, which, as stated, carries the cutter-blades U'.

The ram D is retained between the clamp E and the brace F to prevent it from swinging sidewise, and the mechanical construction is such that the movement of the ram D operates both the clamp E to clamp the corrugated sheet during the cutting and expanding action and also controls the feeding forward of the sheet between strokes.

Fig. 1 shows the machine after two strokes have been made with the mechanism in readiness for a third stroke. As the shaft A^2 revolves the links K will be drawn to the right, thereby depressing the ram until the toggle-links are in a substantially straight line, at which point the ram D will obviously be at its lowermost position. The stroke of the crank A^3 is such that the pins L are not at their extreme position when the ram D is at its extreme position or so that the ram will be all the way down when the crank has made a little less than one-quarter of a revolution. As the central pins L of the toggles are drawn farther to the right the ram D begins to lift and at the same time moves to the right until it strikes against the bearing-piece C', which limits its longitudinal motion, the amount of play between the bearing-piece C' and the end of the ram D being the proper distance the ram is to shift, which should be one-half of the length of a tooth on the upper cutter U. As the shaft continues to revolve the ram is lifted to its extreme height, as shown in Fig. 2, in which position it is ready for the fourth stroke or return stroke. At the other end of the machine there is a similar bearing-piece C', which limits the longitudinal motion of the ram in the other direction. The uncut edge of the corrugated sheet M projects beyond the corrugated cutters U' a distance equal to the thickness of the strands to be cut, and the descent of the upper cutter U slits and expands the sheet into the reticulated form shown in Fig. 2. As the ram D lifts it comes in contact with the pins G, projecting over the top of the ram from the clamp E, thereby lifting the clamp and releasing the sheet, so that it may be fed forward between strokes. The clamp E, as shown, is provided with a corrugated face to coöperate with the corrugations of the sheet. As shown, the clamp E is returned to its clamping position by means of the spring R, which may be a rubber spring, and is carried upon a bolt or rod R', connected to a lug P^2 on the clamp. The clamp in lifting also operates the sheet-feeding mechanism. As shown, the clamp E is connected to an arm T by means of a pin T', projecting through the right-hand housing B. The arm T is pivotally connected with the arm Z, which is free to swing on the shaft V, to which is connected to rotate therewith the ratchet-wheel X, actuated by the pawl Y, pivoted to the arm Z. As the clamp E moves upward it will be seen that the arm T is raised, which draws the arm Z upward and actuates the ratchet-wheel X by means of the pawl Y. Attached to the shaft V are two sprocket-wheels W, over which pass chains S, which are carried at the back of the machine by other similar sprocket-wheels on the shaft Q. Attached to the chains is the feeding-bridge P, which pushes the sheet M forward at each lift of the clamp by means of the fingers N, pivoted to the brackets O.

Obviously some features of this invention may be used without others, and the invention may be embodied in widely-varying forms.

Therefore, without limiting the invention to the devices shown and described and without enumerating equivalents, I claim, and desire to obtain by Letters Patent, the following:

1. In a machine for making expanded metal, the combination of means for suitably supporting a sheet of metal corrugated to expand with the opening or expansion with the corrugated edge projecting beyond the support, and means for slitting and expanding or opening the metal, one line of slits after another along the corrugated edge presented at the edge of the support, thereby straightening the corrugations, leaving unsevered joints or connections between the rows of strands so formed.

2. In a machine for making expanded metal, the combination of means for suitably supporting a sheet of metal corrugated to shorten it and afford provision for the expansion or opening without substantially stretching with the corrugated edge projecting beyond the support, means for slitting the sheet along the corrugated edge transversely to the corrugations and pressing and forming the strands away from the general plane of the corrugated sheet thereby straightening the corrugations to form a row of meshes or part meshes, and means for successively slitting

and forming other rows in like manner, leaving uncut connections between the strands of adjacent rows.

3. In a machine for making expanded metal, the combination of means for suitably supporting a sheet of metal, corrugated in a manner to shorten it in the direction of the slits to be formed with the corrugated edge projecting beyond the support, means for simultaneously slitting and bending portions of the sheet along the corrugated edge in such manner as to substantially straighten out the corrugations in the strands so formed, while leaving such strands connected to the body of the sheet between such slits, and means for simultaneously slitting and bending the sheet in like manner in places alternate to the first-mentioned portions, thus producing the finished expanded sheet metal of substantially the same length as the corrugated or shortened sheet.

4. In a machine for making expanded metal, the combination with means for suitably supporting a corrugated sheet in position to be expanded with the corrugated edge projecting beyond the support, and means for simultaneously slitting and opening portions of the sheet along the corrugated edge presented beyond the support thereby straightening the corrugations to form meshes or part meshes.

5. In a machine for making expanded metal, the combination with means for suitably supporting a sheet of metal corrugated or crimped to shorten the sheet in the direction of the slits to be formed with the corrugated edge presented beyond the support, thereby straightening the corrugations to form an open or reticulated expanded structure without substantial stretching of the metal itself.

6. In a machine for expanding sheet metal, the combination of means for supporting a corrugated sheet of metal with the corrugated edge continuously presented beyond the support, and means for slitting and expanding the sheet in a direction substantially at right angles to the general plane of the sheet and transversely to the corrugations along the corrugated edge continuously presented to the slitting and expanding means, thereby straightening out the corrugations.

7. In a machine for expanding sheet metal, the combination of means for supporting a corrugated sheet of metal with the corrugated edge continually presented beyond the support, and means for slitting and expanding the sheet transversely to the corrugations along the corrugated edge continually presented beyond the support to the action of the slitting and expanding means, thereby straightening out the corrugations.

8. In a machine for expanding sheet metal, the combination of means for supporting a corrugated sheet in suitable position to be cut and expanded with the corrugated edge projecting beyond the support, a reciprocating cutter arranged to slit and expand the projecting corrugated edge of the sheet transversely to the corrugations thereby straightening out the corrugations, means for feeding the sheet between strokes and means for shifting the cutter transversely after each stroke.

9. In a machine for expanding sheet metal, the combination of means for suitably supporting a sheet of corrugated metal in position to be cut and expanded with the corrugated edge projecting beyond the support, a reciprocating cutter adapted to cut, expand the sheet along the corrugated edge and straighten the corrugations, means for shifting said cutter transversely to the direction of reciprocation, and a clamp for holding the sheet and preventing feeding.

10. In a machine for expanding sheet metal, the combination of a corrugated die for supporting a corrugated sheet of metal, with the corrugated edge projecting beyond the die and a toothed cutter adapted to cut and expand the sheet of metal transversely to the corrugations along the said projecting edge and thereby straighten out the corrugations.

11. In a machine for expanding sheet metal, the combination with the corrugated die or cutter for supporting the sheet in position to be cut and expanded with the corrugated edge projecting beyond the edge of the die, and a toothed cutter having a reciprocating movement in two directions at an angle to each other and adapted to cut and expand the sheet of metal along the projecting corrugated edge in a direction transverse to the corrugations and thereby straighten out the corrugations.

12. In a machine for expanding metal, the combination of means for supporting a corrugated sheet of metal in position to be cut and expanded with the corrugated edge projecting beyond the support, and means for cutting and expanding said sheet in a direction transverse to the corrugations along the corrugated edge thereby straightening out the corrugations without shortening the sheet and without substantially stretching the metal.

13. In a machine for expanding metal, the combination of a corrugated die for supporting a sheet of corrugated metal in position to be cut and expanded with the corrugated edge projecting beyond the die, and a toothed cutter adapted to coöperate with the corrugated die and constructed to cut and expand the metal along the corrugated edge without shortening the sheet and without substantially stretching the metal.

14. In a machine for expanding metal, means for cutting and expanding a corru-

gated sheet of metal along the corrugated edge transversely to the plane of the sheet and thereby straightening the corrugations without shortening the sheet and without substantially stretching the metal.

15. In a machine for expanding metal, the combination of coöperating dies or cutters constructed to cut and expand a corrugated sheet of metal along the corrugated edge transversely to the plane of the sheet thereby straightening out the corrugations withou shortening the sheet and without substar tially stretching the metal.

In testimony whereof I have signed thi specification in the presence of two subscrib ing witnesses.

HERBERT E. WHITE.

Witnesses:
O. D. KAISER,
H. T. SMITH.