W. H. COOLEY.

METHOD OF FORMING EXPANDED METAL.

APPLICATION FILED JAN. 2, 1909.

942,309.

Patented Dec. 7, 1909.

2 SHEETS—SHEET 1.

FIG. 2

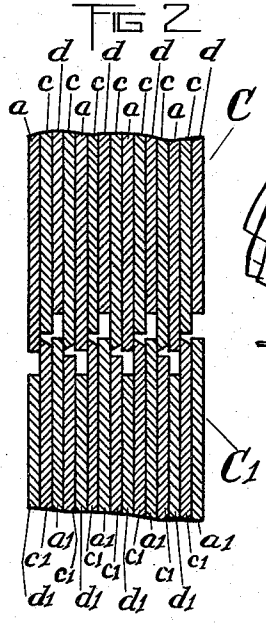


FIG. 1

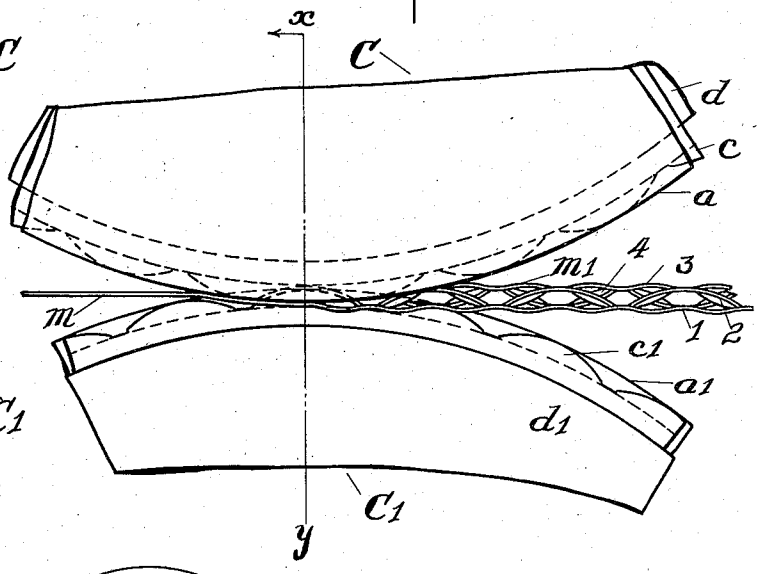


FIG. 3

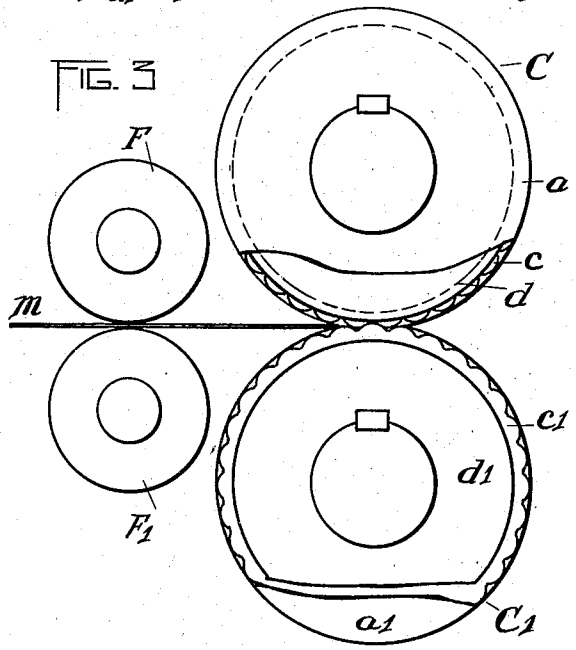
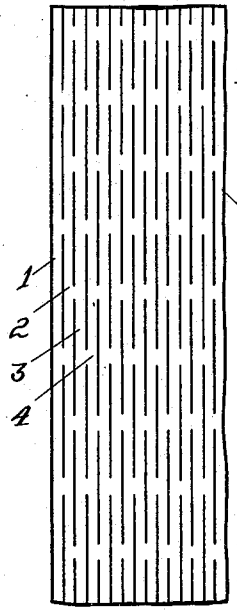


FIG. 4



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2 SHEETS—SHEET 2.

FIG. 5

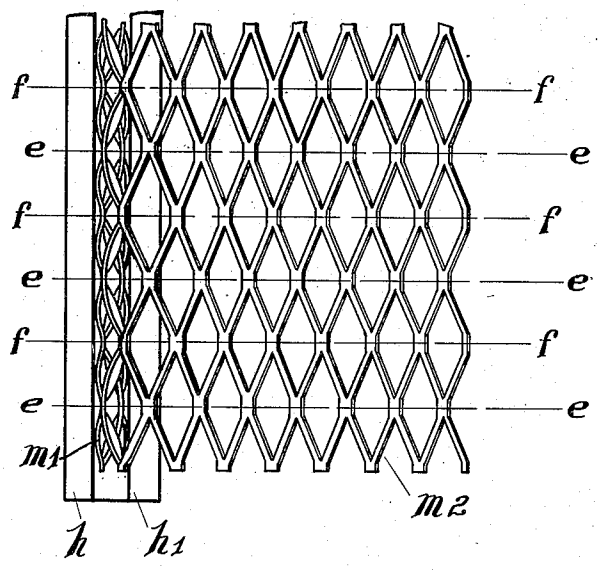
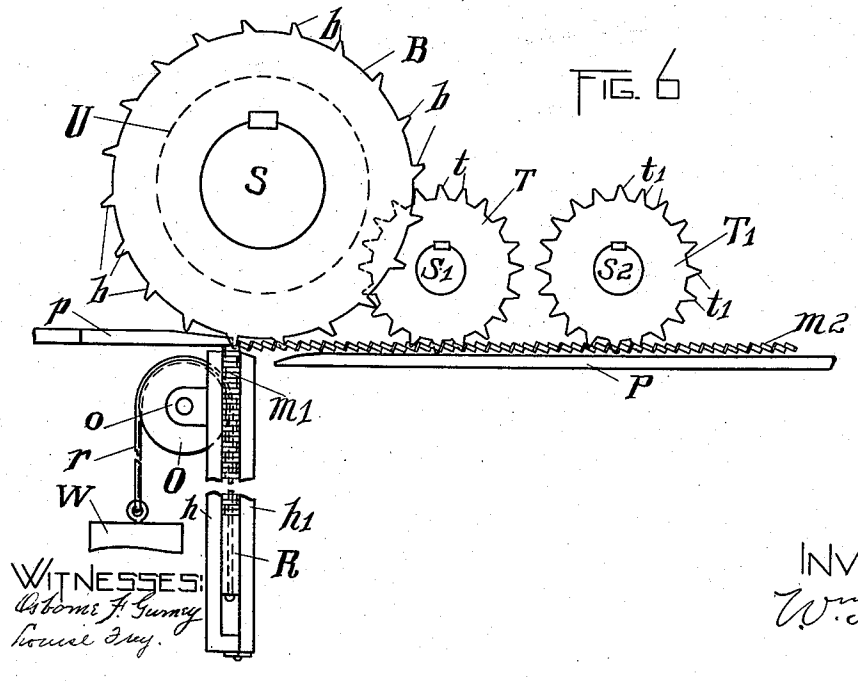


FIG. 6



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METHOD OF FORMING EXPANDED METAL.

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To all whom it may concern:

Be it known that I, WILLIAM H. COOLEY, a citizen of the United States, and a resident of Brockport, in the county of Monroe and State of New York, have invented a new and Improved Method of Forming Expanded Metal, of which the following is a specification.

The object of my present invention is to provide a method of forming metal which shall necessitate a minimum number of steps and amount of handling of the metal and in practicing which the metal may be expanded substantially without stretching the same.

In carrying out my invention, I first form a series of alternately interrupted cuts in the metal and simultaneously bend the continuously extending strips between the series of alined cuts to uniformly shorten the metal in the direction of the cuts to permit the expansion of the metal by engaging the same at keys or series of points on the opposite sides of the cuts and forcing such keys or points relatively apart in substantially straight lines in substantially parallel planes.

It is immaterial for the purpose of my present invention whether the cutting means for forming the interrupted cuts and simultaneously shortening the sheet in the direction of the cuts, as well as also the expanding mechanism, be of the reciprocating or of the rotary character, although the latter only is shown in the accompanying drawings illustrating diagrammatically means for practicing my method of forming expanded metal.

Such drawings are as follows:—Figure 1 is a side view of a part of the coöperating portion of the cutting and shortening mechanism with a sheet of the metal shown as being operated on thereby, a portion of the sheet being shown as having been cut and shortened. Fig. 2 is a vertical sectional view of parts of the mechanism seen in Fig. 1 and taken along the dotted line x—y of Fig. 1. Fig. 3 is a side view of the cutting and feeding rollers with a part of the end disks of the cutting rollers next to the observer removed. Fig. 4 shows a plan view of a portion of a sheet of metal after having been operated upon by the cutting and corrugating mechanism. Fig. 5 is a plan view of the means for holding the cut and shortened metal and shows in plan view a portion of the metal as having been expanded. Fig. 6 is a diagrammatical side view of the expanding mechanism.

Similar characters refer to similar parts throughout the several drawings.

Referring to Figs. 1, 2, and 3,—the sheet of metal m to be cut and shortened is fed from left to right through the machine and engaged first by the feed rollers F and F^1 and advanced thereby into engagement with and between the cutting rollers C and C^1. The cutting rollers C and C^1, as indicated in Figs. 1, 2, and 3, to which reference is now made, are built up of cutting disks arranged and coöperating as follows:—Starting at the end of the rollers toward the observer in Figs. 1 and 3, being the left hand end in Fig. 2, the upper roller comprises a series of plain disks a spaced apart by a distance equaling substantially thrice their thickness. The lower roller comprises similarly a series of plain disks a^1 spaced apart by substantially a distance equaling thrice their thickness. Between each two adjacent disks a are located, starting at the left, first a cutter c and then a spacing disk d and then another cutter c, while similarly between each two adjacent disks a^1 are located, first a cutter c^1 and then a spacing disk d^1 and then a cutter c^1, these disks and cutters being so spaced and located on their respective shafts that two cutter disks on one shaft with a plain disk between them engage between two plain disks on the other shaft and opposite each plain disk on one shaft is located a spacing disk on the other shaft. The plain disks are of such a diameter that they overlap each other at their peripheries by substantially just twice that amount which the metal is to be displaced from the initial plane thereof at the deepest points in the cuts, as indicated in Figs. 1 and 2. The diameter of the cutter disks c and c^1 at their outermost points is substantially the same as that of the plain disks a and a^1. The cutter disks c and c^1 are so arranged angularly that the maximum diameter of a cutter c comes opposite a point midway between two adjacent points of maximum diameter in the cutters c^1 and vice versa. There is, however, left between the two oppositely positioned cutters c and c^1 a space amply sufficient for the free passage between them of the metal m. The cutting projections on the cutters c and c^1 may be arranged and conformed substantially as shown in Figs. 1, 2,

and 3. The cutter disks of one cutting roller shear or cut the metal against the adjacent edge and face of a plain disk in the other roller. The result of this arrangement is that cutters c and c^1 coöperating with the plain disks a^1 and a respectively, cut the metal in the manner clearly indicated in Fig. 1 and more fully described as follows:—The plain disks a force downwardly from the initial plane of the metal strips 1, the width of each of which is substantially the thickness of such plain disks and the plain disks a^1 force upwardly from the initial plane of the metal strips 3, the width of each of which is substantially the thickness of such plain disks a^1 and between such of such strips of the metal forced downwardly below its initial plane and the adjacent strips forced upwardly from the initial plane of the metal there are formed a series of connecting bars 2 and 4, joined to the upper strips and to the lower strips at points denominated keys or bonds in the cut and expanded metal. Each coöperating pair of cutters c and c^1 is arranged to leave uncut portions or bonds in the metal between or opposite the centers of the cuts formed by an adjacent coöperating pair of such cutters, as indicated diagrammatically in Fig. 4. The result of this is that there is formed in the cut metal series of strips 1 extending continuously below the initial plane of the metal and series of strips 3 extending continuously above the initial plane of the metal and such strips extending continuously above are connected to those strips extending continuously below by intermediate strips 2 and 4 of equal width connected to such first named strips at alternating points, as indicated in edge view in Fig. 1. By the operation of the cutting and shortening rolls the sheet of metal m in passing through and being operated upon thereby assumes the conformation indicated in Fig. 1 and is thus shortened in the direction of the cuts by an amount sufficient to permit the expansion of the metal, in the manner to be hereinafter described, without a further shortening and substantially without stretching the metal.

Referring now to Figs. 5 and 6, after the sheet has been cut and shortened in the way described it is placed between the two guiding members h and h^1 with the cuts horizontally arranged. The metal m^1 rests upon a guiding or supporting plate R, which has attached thereto a cord r, such cord extending over the pulley O having bearings for its supporting shaft in the ears o carried by the plate h. The cord r is attached to the weight W which operates to force the cut and shortened sheet of metal m^1 up against the series of fingers, one of which is seen in Fig. 6 at p, in such a way as to be engaged by the teeth b on a series of expanding disks B supported on the shaft S. These disks B are spaced apart by collars U so that they will engage keys in the rows marked e—e in Fig. 5, showing a part of the expanded metal in plan view and a plan view of the metal from which it is being expanded. These teeth b are spaced such a distance apart on the disks B that they engage only every other key in the rows e—e. To the rear, or to right in Fig. 6, of the series of disks B are seen two series of disks T and T^1 similarly supported upon shafts S^1 and S^2 respectively. The disks T are spaced intermediate of the disks B and the teeth thereon are arranged to engage every key in each of the rows f—f as seen in Fig. 5, while the disks T^1 are spaced and positioned to engage every key in the rows e—e and are hence to the rear of and in alinement with the corresponding disks B. The metal as it is engaged by the series of expanding disks B, T, and T^1 is drawn to the right upon the bed piece P, the space between the upper side of which and the bodies of the disks T and T^1, between the engaging teeth thereon, is such that the keys passing under these disks T and T^1 are inclined over to the right to give to the keys an appreciable inclination relative to the plane of the bed piece P and the expanded metal m^2 thereon. The series of disks B, T and T^1 are driven at substantially the same peripheral speed. The teeth b on the disks B it will be noted engage every other key in the rows e—e, that is, those keys which are to the right or next to the guiding plate h^1, while every intermediate one of such keys in the rows e—e contacts with or lies against the guide plate h. In the same way the keys in the row f—f lie alternately against the plate h and the plate h^1, but the keys in such row e—e are advanced by the teeth b so as to be properly engaged by the teeth t and t^1 on the disks T and T^1.

Attention is especially called to the following features in my method of forming expanded metal: The sheet is shortened in the direction of the cuts or in a direction transverse to the direction of expansion by an amount sufficient to permit the desired expansion of the sheet without a further shortening of the sheet and substantially without stretching the metal.

What I claim is:

1. The improved method of forming expanded metal which consists in forming alternatingly interrupted series of cuts in the metal to leave alternating keys between the cuts at their interruptions and simultaneously bending the strips extending longitudinally of and between the cuts to uniformly shorten the sheet in the direction of the cuts to permit the expansion of the sheet substantially without a further shortening of the sheet in the direction of the cuts and substantially without stretching the metal,

and drawing points correspondingly located on opposite sides of and relatively to the cuts, in the metal thus prepared, without a further intermediate corrugating or treatment, apart in substantially straight and parallel lines substantially without stretching the metal and substantially without shortening the metal in the direction of the cuts.

2. The improved method of forming expanded metal which consists in forming alternatingly interrupted series of cuts in the metal to leave alternating keys between the cuts at their interruptions and simultaneously bending the strips extending longitudinally of and between the cuts to shorten the sheet in the direction of the cuts to permit the expansion of the sheet substantially without a further shortening of the sheet in the direction of the cuts and substantially without stretching the metal and drawing points correspondingly located on opposite sides of and relatively to the cuts in the metal thus prepared, without a further intermediate corrugating or treatment, apart in substantially straight and parallel lines substantially without stretching the metal and substantially without shortening the metal in the direction of the cuts.

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