

No. 689,280.

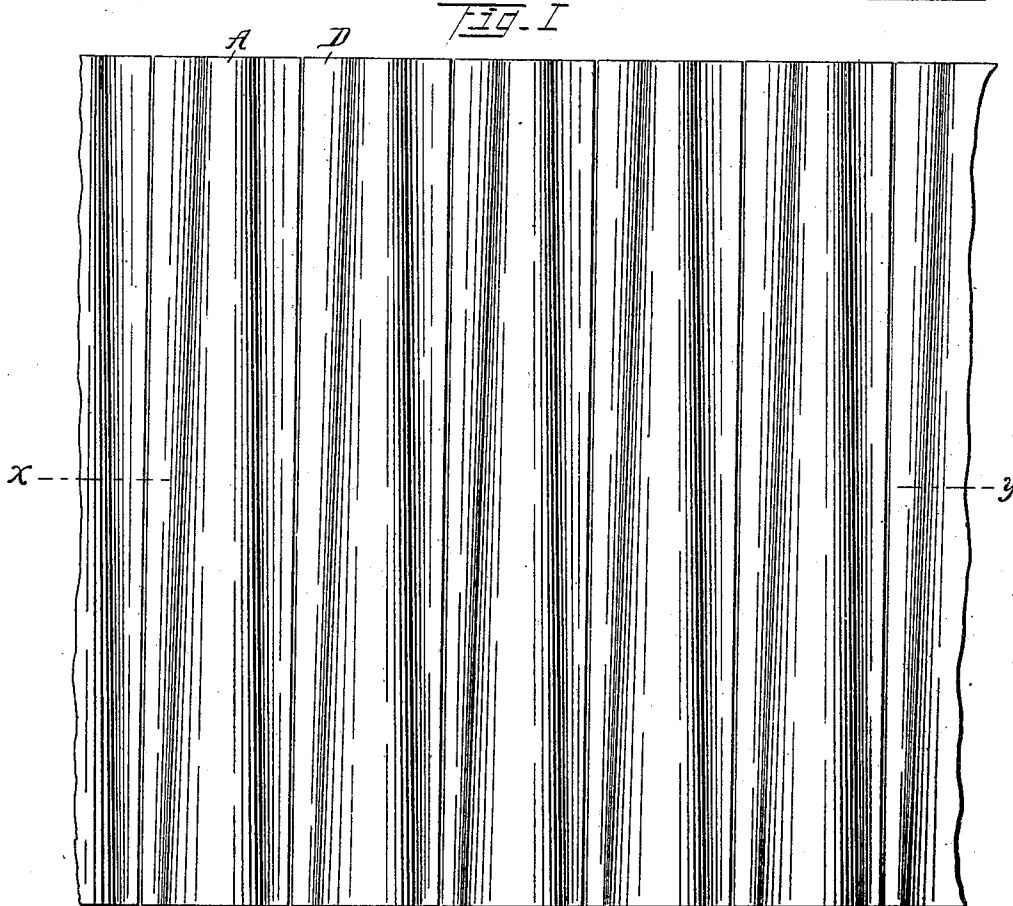
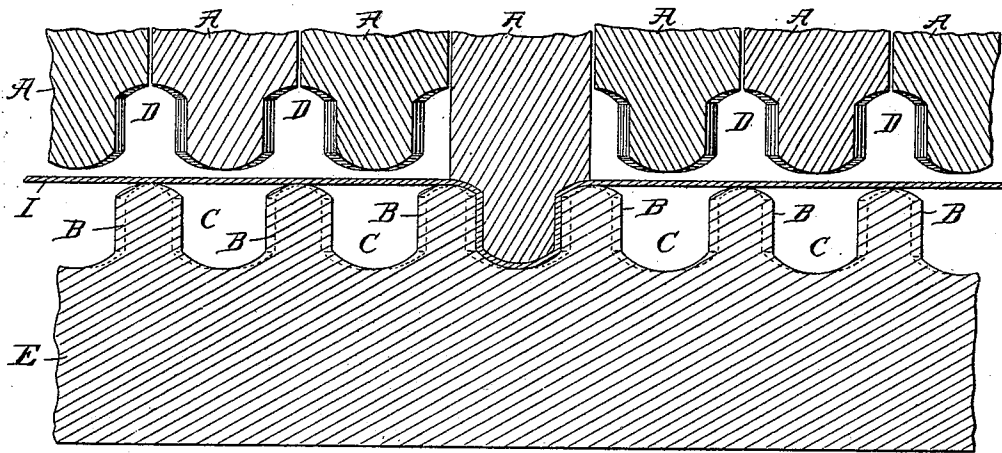
Patented Dec. 17, 1901.

A. E. BROWN.
METHOD OF CORRUGATING SHEET METAL.

(Application filed Mar. 7, 1901.)

(No Model.)

2 Sheets—Sheet I.



Witnesses:

A. Grizwold
Wm. E. Brooke

Fig. II

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Alexander E. Brown,
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2 Sheets—Sheet 2.

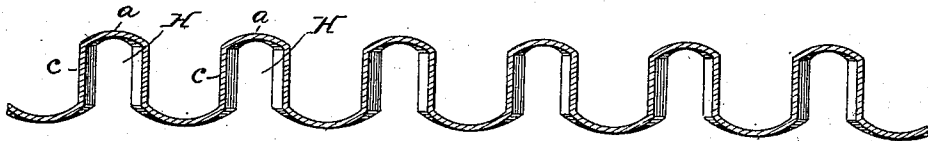


Fig. III

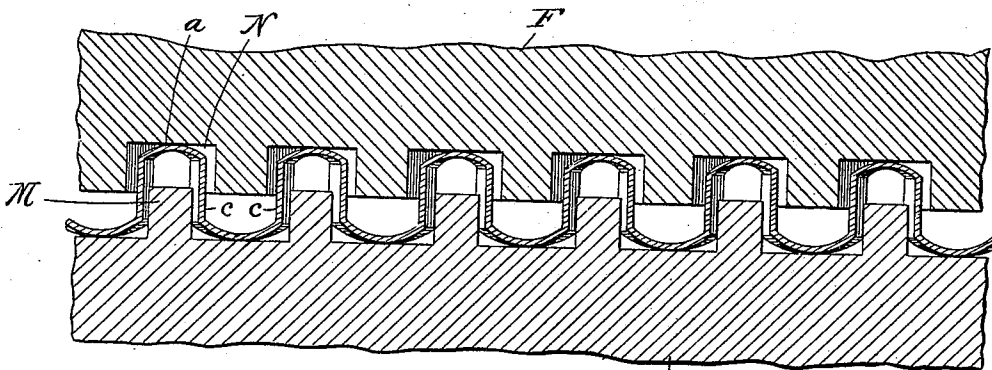


Fig. IV

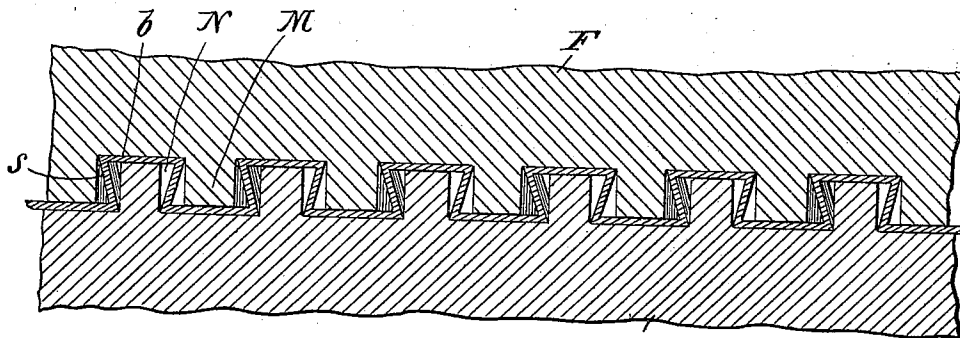


Fig. V

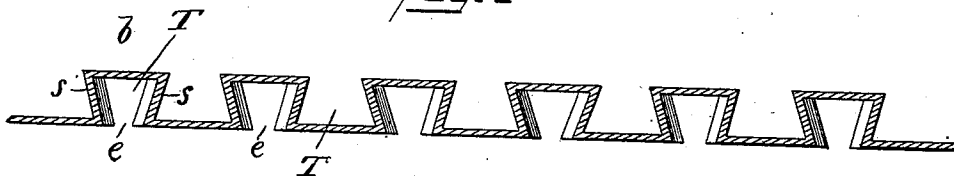


Fig. VI

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UNITED STATES PATENT OFFICE.

ALEXANDER E. BROWN, OF CLEVELAND, OHIO, ASSIGNOR TO THE BROWN
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METHOD OF CORRUGATING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 689,280, dated December 17, 1901.

Application filed March 7, 1901. Serial No. 50,216. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER E. BROWN, of Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Method of Corrugating Sheet Metal or other Suitable Material into Alternately-Reversed Dovetailed Cavities or Recesses; and I hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this application.

My invention relates to that general class of operating processes whereby the material to be treated is passed between or beneath dies or plungers, and thereby stamped into or impressed with the particular form of indentation desired, and belongs more especially to that division of the above class which has for its object the production in and across the surface of a given material of a series of dovetail-shaped tongues and grooves, all in the manner and by the means hereinafter described.

The desirability of some means for rapidly and accurately producing the above kind of corrugations has always been recognized, especially by those who are directly occupied with the building art. The dovetail shape of tongues and grooves would seem, above all other forms, to afford at the same time the highest degree of stiffness to the composite matter of which it is to be the central and supporting member and the greatest assurance that any plastic coatings to be applied thereto as further members of such composite matter will be held secure in their original place. Whenever, however, the introduction and use of the dovetail form of support in connection with the means of sustaining layers or coatings of material going to make up walls, floors, or roofs have hitherto been considered, the precise manner of advantageously arranging or distributing the locking-points of such support, and particularly of economically producing the same, has seemed an insurmountable obstacle to any practicable invention.

In an application for a United States patent of even date herewith, which application bears Serial No. 50,215, I have solved the problem of an advantageous arrangement

and use of the dovetail form of locking-support referred to, and by my present invention I provide a method by which a given piece of material by successive mechanical treatments may be speedily and inexpensively prepared for all uses, including those covered by my said application, to which the special superficial contour when thus prepared may be adapted.

To enable those skilled in the art to which my invention relates to make and use the same, I will now describe it more particularly, referring by letters to the accompanying drawings, wherein I have illustrated the important operative parts which in one form or another enter into the invention in question.

In the drawings, Figure I is a cross-sectional view, on the line *x y* of Fig. II, of a gang or train of stamps or plunger-like dies and corresponding underlying tongues between which the material to be operated upon as above referred to is placed in the first stage of my said method. Fig. II is a view of the faces of the said stamps or plungers. Fig. III is an end view of a piece of the material after it has been subjected to the operation of the said stamps or plunger-like dies and tongues, shown in Fig. I. Fig. IV is a cross-sectional view of a set of the dies and tongues within which the material, as shown in Fig. III, is next to be placed and operated upon. Fig. V is the same cross-sectional view as Fig. IV, except in Fig. V the operative parts are represented in the relative position those parts will assume at the close of their operation. Fig. VI is an end view of a piece of material after it has been fully operated upon by my said machinery and brought thereby to the series of dovetail-shaped corrugations desired.

In all the figures the same parts will be found denoted by the same letters of reference.

I represents the material undergoing treatment in the various stages thereof.

A A A, Fig. I, is a cross-section view, along the line *x y* of Fig. II, of a gang or train of separately-actuated plunger-like dies, and E is a sectional view of a die-plate or bed provided at its upper surface with a corresponding series of dies B B B, the interspaces C C

between which constitute a series of die-cavities so arranged beneath the plunger-dies A as to severally register therewith, with space between the registering parts when home equal to the thickness of the material operated upon. The interspaces D D D between the plunger-dies A, on the other hand, constitute a like series of die-cavities registering with the series of dies B. The plunger-dies A, like the dies B, are rib-like in character, being prolonged in their longitudinal dimensions to suit the surface of material to be operated upon, and said dies A and B, with their corresponding die-cavities C and D, as shown in the drawings, are given a slight longitudinal taper of perhaps no more than double the thickness of the metal or material for the purpose of stamping out corrugations of a particular form for use in a specific manner in roofing and like connections, constituting the subject of one of the claims in my application for a patent already referred to herein. So far, however, as my present invention is concerned this tapering arrangement of dies and intervening die-cavities is not essential, the process and principle involved being the same whether the parts referred to taper, as shown, or are parallel and of equal sectional dimensions throughout. The faces of the several dies A and B are made convex to any degree desired, and their corresponding seats in the several cavities C and D concave to the same degree, all for a purpose hereinafter to be made clearly to appear.

Turning now to Figs. IV and V, F and G are respectively upper and lower compression-plates, each provided with a series of male and female forming members M and N, the male members of the plate F registering, of course, with the female members N of the plate G and the male members of the plate G registering with the female members N of the plate F. The said members M and N should correspond in longitudinal dimensions and in taper with the same features of the several dies A and B and the die-cavities C and D. The remaining dimensions of said parts or members M and N may in all cases be determined by a consideration of the widest and narrowest transverse measurements that the finished dovetail is to have, making allowance, of course, in the calculation for the thickness of the material treated. For this purpose a cross-sectional outline of the dovetail is first drawn—as, for instance, as represented by the outlines T T in Fig. VI—according to the scale required, which will of course show the width of the entrance e , Fig. VI, and of the base b , as well as the length of the sides $s s$. It is manifest that the width of the members M must be the same as that of the entrance e and that their height will be exactly measured by the longer side of a right-angled triangle whose hypotenuse is one of the sides s and whose other side is equal to one-half the difference between the greatest

transverse width of the proposed dovetail and of the part A or entrance e . Having thus ascertained and determined the several dimensions of the formative parts or members M and N, whereby, as will be seen, the dovetail itself is finally to be shaped, the dies A B and cavities C and D, whereby the corrugations H H are to be derived, should be made to correspond thereto in order that the quantity of material that is to constitute a given corrugation H shall be the same as that which is to be converted into and constitute a given dovetail T of the finished product.

While the above method of determining the relative proportions of the several formative parts is simple and accurate, it is by no means the only one; but, however such proportions are arrived at, it will be found advisable in practice to have those proportions such that the sides $c c$ of the corrugations H and the sides $s s$ of the dovetail T are of the same length and the arc a equal to the side b of the dovetail proposed.

Having thus pointed out in a manner that will clearly inform those skilled in the art the salient features of the method in question, it simply remains to connectedly explain the operation itself. This consists, first, in introducing the material (which may be here considered as sheet metal) between the stamps or plunger-dies A A and the tongue-like dies B. The said dies A are adapted to be operated in succession and beginning with any one of the train. It will be found better practice to select the middle die of said train in succession in each direction therefrom, inasmuch as by this order, besides being the more rapid in operation, the material is at once automatically anchored at its center, but at the same time in such manner that its remaining portions shall be free to be drawn in by said plungers as they in turn descend into their respective die-cavities C. Of course it would equally answer if the stamps or plunger-like dies A A were worked in succession from one end of the train to the other; but this course would necessitate a special anchoring of the material at the end from which the operation is to proceed, which can be avoided, as explained, by starting the dies at some point between the ends of the train, and thereby and at the same time securing an effective resistance to the draw of the next succeeding stamp or plunger-die. The gang or train having thus been successively driven home to their respective seats C, the material will thereby have been stamped or pressed into a series of arch-like corrugations having an end view such as is depicted in Fig. III. The next succeeding step in my method or process is to introduce the said material M as thus corrugated between the die-plates F and G, fitting the several corrugations H over and upon the members M in the lower of said plates G. It is evident that if in this position the upper plate F is made to approach the plate G and to finally reach a bearing

therewith the several corrugations H will be pressed down against the plunger-dies M by the interior flat surface of the parts N. Inasmuch as the lower or open end of said corrugations are at the same time firmly held against expansion by and between the several plungers M, the remaining portion of said corrugations will be driven in straight lines to occupy the space upwardly therefrom within the parts N, which space, as has been explained before, is just ample for the purpose. The arc α in the figures will in this manner be flattened downwardly, occupying and becoming the upper and longer side of the dovetail sought and at the same time spreading the sides $c c$ outwardly from their lower ends into the remaining sides of said dovetail $s s$.

Although I make use of the compression-plates F and G specified, it is plain that the employment of rolls to effect the desired compression would equally be within my invention, and said compression-plates F and G in the drawings may for this purpose be considered as also illustrating sections of roll-faces accordingly.

Of course the precise form of the dovetail shape shown by me herein may be varied by varying the relation and proportionate dimensions of the operative parts I have described and still be within the method I have just disclosed herein; but the form and relative measurements of the said corrugations, as well as of the said parts, present and illustrate said method in a complete and practicable manner, and so that any and all conceivable variations thereof may be readily worked out and derived.

Having thus described my said invention, what I claim, and desire to secure by Letters Patent, is—

1. A mode or method of producing dovetail-

shaped corrugations, in material, wherein said material is, first, impressed with a series of upright corrugations which latter corrugations, are then compressed within forming-dies whose chief bearing-surfaces respectively, are planes having their greatest width equal to at least the greatest cross-dimension of the dovetail corrugation sought, substantially as shown and described.

2. A mode or method of producing alternately-reversed dovetail-shaped indentations, or recesses, in material, whereby said material is first impressed with alternately-reversed indentations, or recesses, having upright sides, and, convex, or concave, tops, and, then subjected to compression within forming-dies, having bearing-surfaces, respectively, which are planes with a greatest width equal to at least the greatest cross-dimension of the dovetail-shaped indentations, or recesses sought, substantially as shown and described.

3. A method of forming or converting a series of upright alternately-reversed corrugations having convex or concave tops, into a series of alternately-reversed dovetail-shaped corrugations, consisting of the subjecting of said upright corrugations to the action of two compression-plates, or rolls, each provided with a series of alternately-arranged forming and plunger dies, reciprocally registering, one series with the other, the said forming-dies having a bearing-surface with a diameter equal to at least the greatest cross-dimension of the dovetail corrugations sought, substantially as shown and described.

ALEXANDER E. BROWN.

In presence of—

F. G. TALLMAN,
M. MILLARD.