H. E. WHITE.

EXPANDED METAL PRODUCT.

APPLICATION FILED SEPT. 4, 1913.

1,268,903.

Patented June 11, 1918.

FIG. 1.

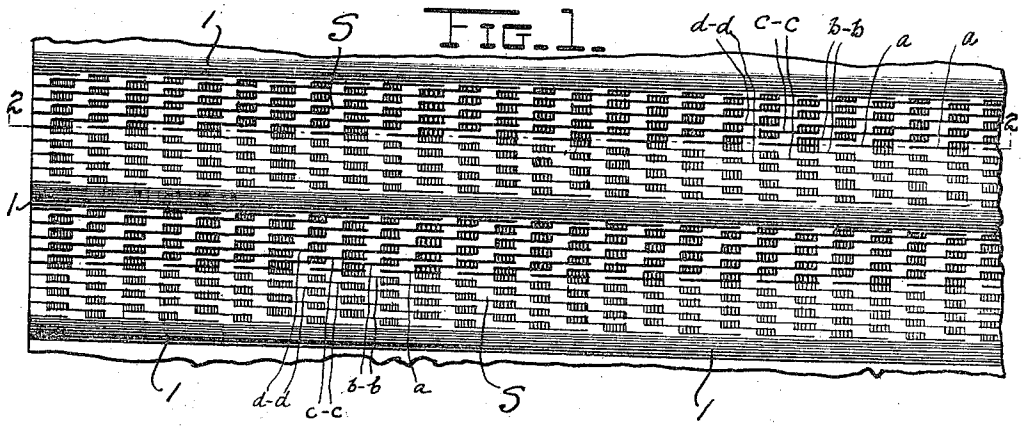



FIG. 2.

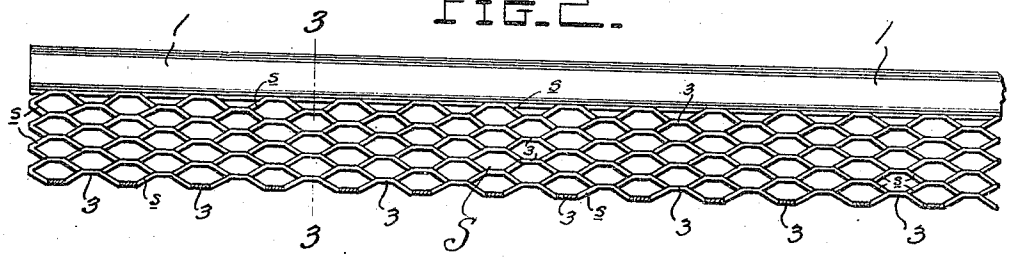


FIG. 3.

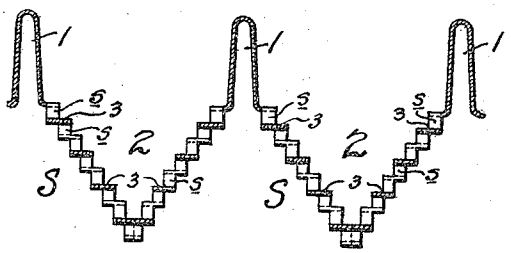
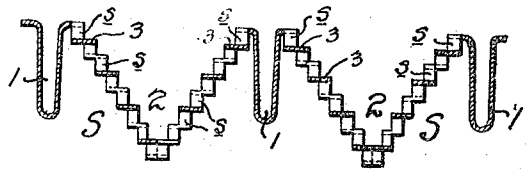


FIG. 4.



Witnesses

Harry B. Rook.

Emory L. Groff.

Inventor

HERBERT E. WHITE.

By D. V. Wolhaupter. his Attorneys

# UNITED STATES PATENT OFFICE.

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

## EXPANDED-METAL PRODUCT.

1,268,903. Specification of Letters Patent. Patented June 11, 1918.

Application filed September 4, 1913. Serial No. 788,154.

*To all whom it may concern:*

Be it known that I, HERBERT E. WHITE, a citizen of the United States, residing at Youngstown, in the county of Mahoning and State of Ohio, have invented certain new and useful Improvements in Expanded-Metal Products, of which the following is a specification.

This invention relates to a novel and useful form of ribbed expanded metal product possessing utility as a supporting and reinforcing element for cementitious material in building structures, particularly in the construction of partitions, floors and roofs.

To this end, the invention has in view an expanded metal ribbed structure having maximum strength and stiffness while at the same time providing effective keys for the cementitious material and also capable of being manufactured readily and economically.

A special object of the invention is to provide an open-mesh expanded section, between the ribs or uncut areas of a metal sheet, which is displaced or projected to one side of the original plane of the sheet and is in such form as to materially increase the general stiffness of the product as well as to provide for holding the concrete or other cementitious material in such a manner that the product will effectively support and reinforce the structure in which it is embodied. By reason of the characteristics indicated, the improved product is well adapted for use as a self-centering material.

With these and other objects in view, which will be apparent to those familiar with expanded metal products of this character, the invention consists in the novel construction, combination, and arrangement of parts hereinafter more fully described, illustrated and claimed.

Though susceptible of structural modification in minor particulars, one practical embodiment of the invention is shown in the accompanying drawings, in which—

Figure 1 is a plan view of the new product, the view illustrating a section consisting of three ribs and two expanded areas; Fig. 2 is a longitudinal sectional view through one of the transversely arched expanded sections, the line of section being indicated by the line 2—2 on Fig. 1;

Fig. 3 is a cross sectional view of the new product on the line 3—3 of Fig. 2;

Fig. 4 is a similar view illustrating a modification wherein the ribs may project in the same direction from one side of the plane of the sheet as the arched expanded sections.

Like references designate corresponding parts in the several figures of the drawings.

In its preferable embodiment, the novel form of sheet metal expanded structure claimed herein includes a metal sheet having a plurality of deeply grooved ribs, designated by the numeral 1, and open-mesh expanded sections S between at least one pair of the ribs and projected to one side of the flat plane of the sheet. These ribs may be produced in any manner, such for instance as by the process disclosed in my former Patent No. 1,056,871, dated March 25, 1913, and may be of any depth or height, and all of the ribs of the sheet may be of the same or different depths without affecting the distinguishing features of the present invention. Also it may be understood that the ribs R represent the non-contractible unslitted or uncut areas of the product, and it is between at least one pair of such areas, (usually between every pair), that the sheet is provided with an open-mesh laterally-projecting expanded section S.

A novel and practical characteristic of the open-mesh or reticulated section between any pair of uncut areas or ribs 1 is that of such section being laterally projected to one side of the flat plane of the sheet and also being transversely arched or bowed between the areas or ribs with which it connects. The transverse arching or bowing of the said expanded section provides therein, that is at its concaved side, a longitudinal channel 2 which runs lengthwise thereof and is adapted to receive therein the body of cementitious material, thus disposing the same in such a manner, within and about the expanded sections S, and within and about the ribs or uncut areas 1, as to provide a very intimate and thoroughly bonded union between the expanded metal product and the said material. The product is therefore well adapted for self-centering and reinforcing purposes.

The arch of each laterally projected ex-

panded section S is usually of an approximate V-shape, though it will of course be understood that the precise shape of the arch or bow is not an essential feature. However, each arched expanded section is preferably of uniform construction throughout, and the walls thereof, which are integrally united with the ribs or uncut areas, are made up of open meshes which are substantially diamond shaped and are formed by strands of metal *s*. These strands of metal are disposed longitudinally of the uncut areas or ribs as may be plainly seen in Fig. 1 of the drawings, and are integrally joined to each other by uncut connecting webs 3 at spaced points, as may be plainly seen in Fig. 2 of the drawings, and more particularly in Figs. 3 and 4 of the drawings. Also, it will be observed that the strands *s* of the open meshes, including the uncut connecting webs 3, have their flat faces lying in substantially parallel planes and also substantially parallel to the original flat plane of the metal sheet, producing inclined walls of a stepped formation and thus providing a reticulated construction having a maximum strength and stiffness as well as forming effective keys for the concrete or cement material.

As already indicated, the product is susceptible of structural modifications without affecting the invention, and one of these modifications is suggested in Fig. 4 of the drawings, wherein the ribs are illustrated as all projecting from the plane of the sheet in the same direction as the projecting expanded sections 2.

In order to compensate for the non-contractibility of the uncut areas or ribs, it is necessary to elongate the metal in the individual strands at the time of displacing them from the slit or cut in the sheet, thereby enabling the operation of opening the slits to be uniformly carried out without imposing undue strains on the strands at any point.

The improved product described and claimed herein may be manufactured by any suitable means available or adaptable for the purpose. A preferable means, however, is to subject the metal sheet, which may be preliminarily formed with a series of ribs R, and flat intervening areas, to the combined slitting and displacing action of the dies of the machine disclosed in my former Patent No. 1,049,632, dated January 7, 1913. This machine subjects the metal sheet to an operation which cuts a central line of interrupted longitudinal slits *a* in the said flat areas, and which is succeeded by other lines of interrupted longitudinal slits *b*—*b*, *c*—*c*, *d*—*d*, et cetera, arranged alternately in adjacent lines and simultaneously made on both sides of the central line of slits. Simultaneously with the progressive cutting of the slits on both sides of, and away from, said central line of slits, the strands of metal formed of the slits are displaced or offset to one side of the original flat plane of the sheet with the result of opening up the slits into meshes and at the same time pressing the material thus expanded into the form of a laterally projecting arch as shown in Figs. 3 and 4. This combined slitting and expanding operation elongates the metal in the individual strands for the reasons stated.

I claim:—

1. An expanded metal structure comprising a plurality of uncut areas of open-work expanded sections of trough-like form lying between and projecting to the side of the uncut areas, the walls of each expanded section being of stepped formation and inclined in opposite directions with each inclined wall integrally united at its edge with one of the uncut areas.

2. An expanded metal structure comprising a plurality of uncut areas and open-work expanded sections of trough-like form lying between and projecting to the side of the uncut areas, the opposite walls of each expanded section being inclined in opposite directions and each of said walls comprising open meshes of substantially diamond shape whose strands are stretched and are disposed in planes substantially parallel to each other and to the flat plane of the sheet.

3. An expanded metal structure including a plurality of spaced ribs, and an intermediate V-shaped expanded section between at least a pair of the ribs, the said expanded section consisting of connected convergent walls each of which walls comprises open meshes of substantially diamond shape whose strands are arranged in stepped formation and are disposed in planes substantially parallel to each other and to the flat plane of the sheet.

4. An expanded metal structure including a pair of spaced uncut portions, and an intermediate troughed expanded section projecting from the edges of said uncut portions to one side of the flat plane of the sheet, said expanded section consisting of opposite integrally connected wall portions formed with substantially diamond-shaped meshes.

5. An expanded metal product including a pair of spaced uncut portions, and a troughed expanded section integrally united with and connecting the uncut portions, the said expanded section between the pair of uncut portions consisting of oppositely disposed connected walls, each of which walls comprises open meshes of substantially diamond shape whose strands are stretched and extend longitudinally of the structure.

6. An expanded metal structure compris-

ing a plurality of uncut areas connected by expanded open-work sections of trough-like form, the opposite sides of the trough-like expanded sections being inclined in different directions.

7. An expanded metal structure comprising a plurality of uncut areas and open-work expanded sections of trough-like form lying between the uncut areas, the walls of the expanded sections being inclined in opposite directions with each inclined wall integrally united at its edge with one of the uncut areas.

8. An expanded metal structure consisting of a plurality of spaced ribs, and an intermediate V-shaped expanded section between at least a pair of the ribs, the said expanded section consisting of open-mesh wall portions connected together at the apex of the trough and converging from their point of connection with the ribs.

9. An expanded metal structure consisting of a plurality of spaced ribs, and an intermediate V-shaped expanded section lying in trough-like formation between at least a pair of the ribs, the said expanded section consisting of wall-portions connected together at the apex of the trough and converging from their point of union with the ribs, said wall portions having open meshes whose strands are of stretched metal.

10. An expanded metal structure consisting of a plurality of spaced high ribs, and an intermediate expanded section lying in trough-like formation between and integrally united with at least a pair of the ribs, the said trough-like expanded section consisting of integrally connected inclined wall portions having stretched metal strands.

In testimony whereof I hereunto affix my signature in the presenec of two witnesses.

HERBERT E. WHITE.

Witnesses:
G. R. NAUMAN,
H. R. GLENN.

**Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."**