

W. E. Northen.

Metallic Roof.

N^o 16,767.

Patented Mar. 3, 1857.

Fig. 3.

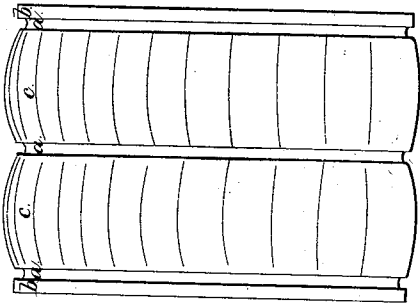


Fig. 4.

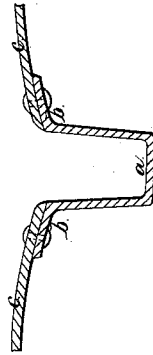


Fig. 1.

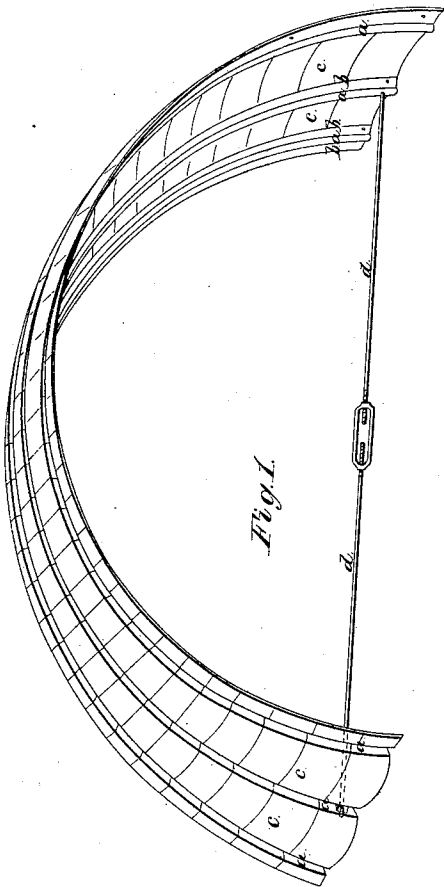
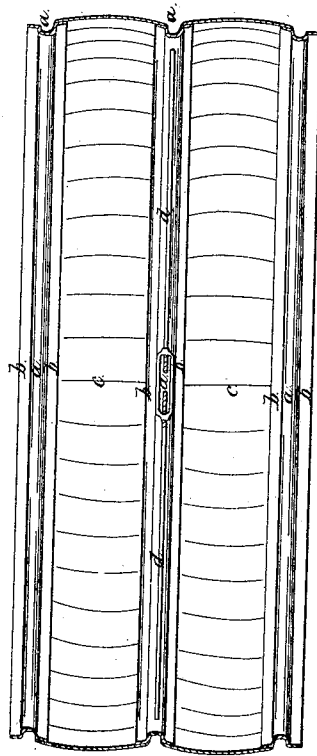


Fig. 2.



UNITED STATES PATENT OFFICE.

WILLIAM E. WORTHEN, OF NEW YORK, N. Y.

IMPROVED METALLIC ROOF.

Specification forming part of Letters Patent No. 16,767, dated March 3, 1857.

To all whom it may concern:

Be it known that I, WILLIAM E. WORTHEN, civil and mechanical engineer, of the city, county, and State of New York, have invented a new and Improved Metallic Roof; and I do hereby declare that the following specification, taken in connection with the drawings, is a full, clear, and exact description thereof.

In the drawings, Figure 1 is a perspective view of a section or portion of a roof. Fig. 2 is a plan of the under side thereof. Fig. 3 is a side elevation; and Fig. 4 is a detail on a large scale, being a section through a rafter and part of the covering between the rafters.

Roofs composed as far as the covering is concerned wholly of metal are now in ordinary use in a great variety of forms, and in some of these the framing supporting the covering is also of metal. There are also other roofs now in use in which the covering supports itself without the aid of beams or framing. The latter class are generally of small span and are constituted of corrugated metal bent into the form of an arch. Such roofs have many advantages, cheapness, lightness, and saving of space, as there are no beams in the way, being the chief; but they have not been applied to large spans, chiefly for two reasons: first, that it is almost impossible by any known process to corrugate metal to a sufficient depth to make an arch sufficiently strong, and, second, that if they could be so constructed there would be so much metal used that they would be of great cost.

Now the object of my invention is to make a roof that shall unite the cheapness and other advantages of the corrugated roofs with a facility of application to large spans; and the nature of my invention consists in combining together hollow metallic beams which themselves act as covering with and by means of metallic plates which are supported by said beams and constitute the remaining portion of the covering of a roof, the whole substantially in the manner hereinafter specified.

In order to make a roof after my plan, I take sheet metal of suitable strength and by any usual means bend it into beams having a section much like the ordinary U railroad-

rail. A number of such beams may then be joined together at their ends, so as to form a single beam of sufficient length, and a number of such beams may then be laid from wall to wall of the building to be covered, and they may, according to the nature and necessities of the case, be either arched, flat, or inclined, or so attached as to constitute ordinary peaked rafters. Other arched metallic plates are then taken and riveted from the flange of one rafter to the flange of the next rafter in succession, and these latter plates are either arched or arched and corrugated, so that they may have sufficient strength.

In the drawings the beams are represented at *aa* and their flanges at *b b*, while the plates between them are shown at *c c*.

In cases where the arched or ordinary peaked form of roof is employed it will be well to use tie-rods such as are shown at *dd*, and if very large beams are required they may be made of several pieces properly attached instead of being bent into shape from a single piece.

Now it is a well-known fact that the strength of beams of a given span increases in a greater ratio than their depth, and that therefore a quantity of iron of any given length and breadth will sustain a greater load when formed into a single U-shaped beam than it will if bent so as to make two U-shaped beams lying side by side, and ordinary corrugated iron may be considered as made up of a number of U-beams lying side by side and joined by their flanges. This principle is the starting-point of my invention; but in order to carry it fully into effect in economizing material I make the beam itself a part of the roof-covering and arch or corrugate the covering-plates attached to and connecting the beams. In this manner the covering-plates constitute a series of little roofs lying between the U-beams, and these little roofs of small span may be made of very thin metal. In case these plates are corrugated their corrugations must run at right angles to the general direction of the main beams, or nearly so, in order to attain strength, and in that case the U-beams serve also as eaves-troughs for each of these little or sub roofs, and de-

liver the water at the walls of the building. The beams serve this same purpose also when the sub-roofs are merely arched.

I intend at times to invert the U-beams, in which case the sides of the beam and the first part of the spring of the arch will make the water-conductors; but such a plan is not as good as that shown on the drawings, as there will be greater risk of leakage at the joints.

Now I think that it needs no demonstration to prove that a roof constructed after my plan will be both light and comparatively inexpensive. An inspection of the drawings will show that almost every portion of the metallic surface is utilized, and in an experimental roof on a large scale already built the practical advantages realized are such as are herein set forth.

Having thus described the roof invented by me, I claim as new and of my own invention—

A roof composed of U-shaped metallic beams which themselves are a portion of the covering, and of arching metallic plates, plain or corrugated, connecting said beams and composing the rest of the covering, the whole being constructed substantially in the manner herein described.

In testimony whereof I have hereunto subscribed my name, in the city of New York, on this 21st day of January, A. D. 1857.

W. E. WORTHEN.

In presence of—

B. ALTHOUSE,
A. L. DU PUGET.