June 16, 1936. I. NOZAWA 2,044,321

METHOD OF CONSTRUCTING ARCUATE STRUCTURES WITH NO STAGING

Filed July 1, 1935

Fig. 1.

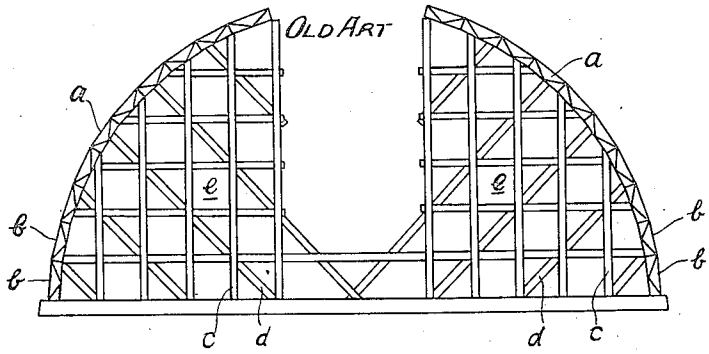
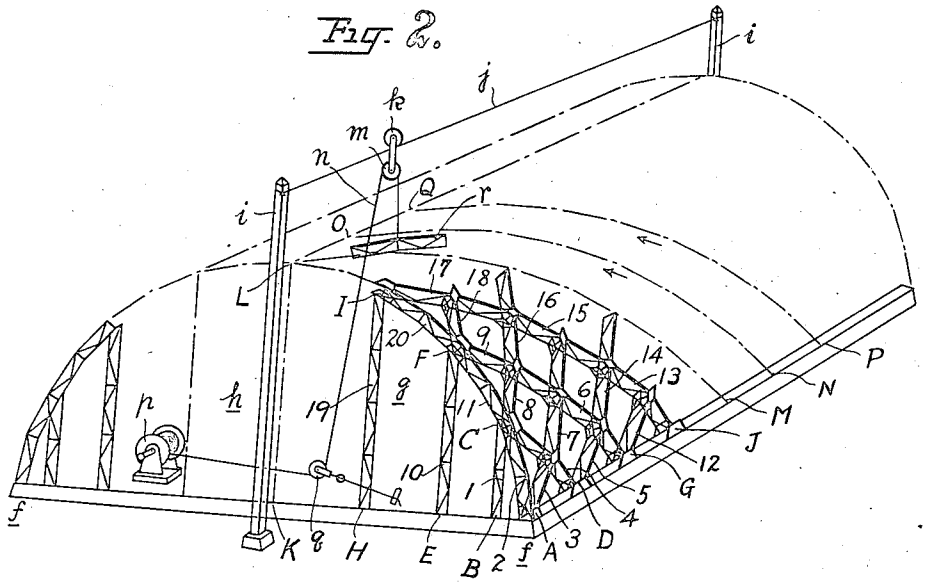


Fig. 2.



Inventor:
I. Nozawa

By Glascock Downing & Seebold
Attorneys.

Patented June 16, 1936

2,044,321

UNITED STATES PATENT OFFICE

2,044,321

METHOD OF CONSTRUCTING ARCUATE STRUCTURES WITH NO STAGING

Ichiro Nozawa, Tsukishima, Kyobashi-ku, Tokyo, Japan

Application July 1, 1935, Serial No. 29,350
In Japan July 4, 1934

2 Claims. (Cl. 108—1)

My invention relates to improvements in method of constructing arcuate structures, and more particularly to the method specified in which arcuate structures are formed by assembling a large number of unit members of relatively short dimensions and of relatively light weight for easy and prompt transportation. By "arcuate structure", I mean a structure the vertical section of which substantially takes any of such shapes as parabolic, semi-circular and other convexed curvatures of substantially continuous nature, and which structure is provided with a wall structure at least at one end. The wall structure may be composed of a number of pillars or formed by assembling a number of unit-elements of relatively short dimensions and of relatively light weight.

One object of my invention is to obtain method of constructing such arcuate structures as above-mentioned in a simple, prompt and economical manner, with no need of using complicated temporary props, stays or stagings during assembling work.

Another object of my invention is to facilitate craning work of the unit members during their assembling.

Other objects and particularities of my invention, together with the details thereof, will be made clear in the following descriptions with reference to the accompanying drawing, wherein:—

Fig. 1 shows diagrammatically how complicated props and stays forming stagings are necessarily used in ordinary method of constructing an arcuate structure.

Fig. 2 shows diagrammatically a manner in which my invention is carried into practice.

In ordinary method of constructing an arcuate structure by assembling a large number of unit members, the structure is worked beginning at the root portions thereof along the whole lengths of both sides of the arcuate structure, and consequently it is necessary to use complicated props and stays forming stagings as shown in Fig. 1, in order to hold the already assembled portions of the structure in position or to prevent the same from falling down.

In Fig. 1 is shown an end elevation of two side portions, *a*, *a*, of the partly assembled arcuate structure. Each side portion is composed of a large number of unit-elements *b* connected with each other in a well-known manner, and is held in position by a large number of props *c* and stays *d* forming a complicated staging *e* as a whole, and the stagings *e*, *e* for both side portions *a*, *a* substantially fill up the inside space of the arcuate structure, and these stagings cannot be disassembled or removed away until the whole structure is completed, or in other words, the two side portions *a*, *a* are connected together along the top line of the structure.

According to my present invention, such complicated props or stays are not necessary, and the structure is worked in such a manner that the already assembled portions thereof hold themselves in position without falling down.

Now referring to Fig. 2, the work is commenced at the root corners *f*, *f* at one walled end *g* of the structure now to be constructed. Thus for the first step, a pillar member **1** to form the end wall *g*, a unit-element **2** to form the border portion and unit-elements **3** and **4** to form the domed portion are assembled and suitably connected together to form a substantially triangular pyramidal truss A—B—C—D. This truss having a pyramidal shape does never fall down because of the fact that the end wall portion A—B—C and the dome portion A—C—D respectively prevents the falling down of the other portion A—C—D and A—B—C, and any props or stay, if used during the assembling of this pyramid A—B—C—D, can be removed away after the pyramid per se is completed, and this pyramid A—B—C—D may be utilized as a staging during the following steps.

For the second step, unit-elements **5**, **6**, **7**, **8**, and **9** to form the domed portion, a pillar member **10** to form the end wall portion and a unit-element **11** to form the border portion are assembled to the first pyramid A—B—C—D and connected together to form the second pyramid A—E—F—G, and after this second pyramid is completed, prop and stays, if any, are removed away. The pyramid A—E—F—G is now self-holding also.

For the third step, unit-elements **12**, **13**, **14**, **15**, **16**, **17**, and **18** to form the domed portion, a pillar member **19** to form the end wall portion and a unit-element **20** to form the border portion are assembled to the second pyramid A—E—F—G and connected together to form the third pyramid A—H—I—J. For the fourth step and so on, similar pyramids are formed in succession until the top point L of the domed structure is reached.

It is to be understood that the similar process is performed for the other or the lefthand end corner in Fig. 2, and substantially triangular pyramidal trusses, such as A—B—C—D, A—E—F—G, A—H—I—J and so on for the right-hand corner, are formed in succession until the

top point L is reached, whereupon the last pyramids for the rightside and the leftside are connected together at the top point L. The last pyramid for the rightside is shown as A—K—L—M. Now the end wall structure *g* is completed.

After the last pyramids for both sides are completed and connected together at the point L, the domed portions are further worked by assembling unit-elements in suitable order as shown by chain lines N—O, P—Q and so on, to complete the domed structure.

In order to facilitate the assembling work, a suitable crane mechanism *h* may be used. The crane mechanism comprises a pair of poles *i, i,* disposed respectively at the ends of the arcuate structure to be constructed, and spanned by a cable *j* over the top of the structure for movably supporting a trolley *k* which carries a pulley *m* over which a rope *n* passes from a lift drum *p* through a guide pulley *q*. A unit-element *r* is conveniently lifted by this crane mechanism as illustrated.

According to my invention, the inside space of the structure is almost empty during the constructing work, and consequently the guide pulley *q* as well as the drum *p*, if necessary, may be readily moved along the whole length of the structure within the same, and the operation is remarkably facilitated in comparison to the ordinary method in which complicated stagings fill up the inside space of the structure and such a convenient craning is prohibited.

It is to be noted that in practicing my invention, any well-known unit members may be used for the structure. They may be single angle bars, or may be ordinary unit-trusses. The unit-elements as shown in United States Patent No. 1,976,188 granted to me on the 9th October, 1934, are preferable. In this patent, two kinds of unit-elements are shown, one of a unit length and the other of a half length. Now referring to Fig. 2 of the present application, each unit-element of the domed portion is composed of a pair of side bars connected together by a plurality of connecters, and the unit-elements **3**, **5**, **12**, **8** and **18** are of the half length while the unit-elements **4**, **6**, **13**, **9**, **15**, **17**, **7**, **14**, and **16** are of the unit length. The border elements **2**, **11**, **20**, etc., may be special unit-elements slightly shorter than the unit length elements **4**, **6**, etc. Each of these elements is disposed in a vertical plane, the upper side bar being shown with heavy line while the lower side bar with light line. The pillar members **1**, **10**, **19**, etc., are of ordinary trusses.

While I have shown and described a preferred manner of carrying out my invention, it is apparent that changes and modifications may be made therein without departing from the spirit and scope of my invention. I desire, therefore, that only such limitations be imposed as are embodied in the appended claims or as may be necessitated by the prior art.

I claim as my invention:—

1. Method of constructing an arcuate structure having at least one end wall, comprising beginning to work at the corners of one end of the structure to assemble a plurality of unit members to form a substantially triangular pyramidal truss, extending the two faces of said pyramidal truss by assembling another plurality of unit members to form a second substantially triangular pyramidal truss, repeating the above-specified extending work until the vertex of the last pyramidal truss reaches the top of the structure, and then extending one face only of the last pyramidal truss by assembling another plurality of unit members until the structure is completed.

2. Method according to claim 1, in which unit members are lifted by a crane mechanism, substantial parts thereof being movable along the structure within the same.

ICHIRO NOZAWA.