Nov. 21, 1933. J. H. POMEROY 1,935,990

APPARATUS FOR CONSTRUCTING LARGE HANGARS

Filed Dec. 5, 1932 2 Sheets-Sheet 1

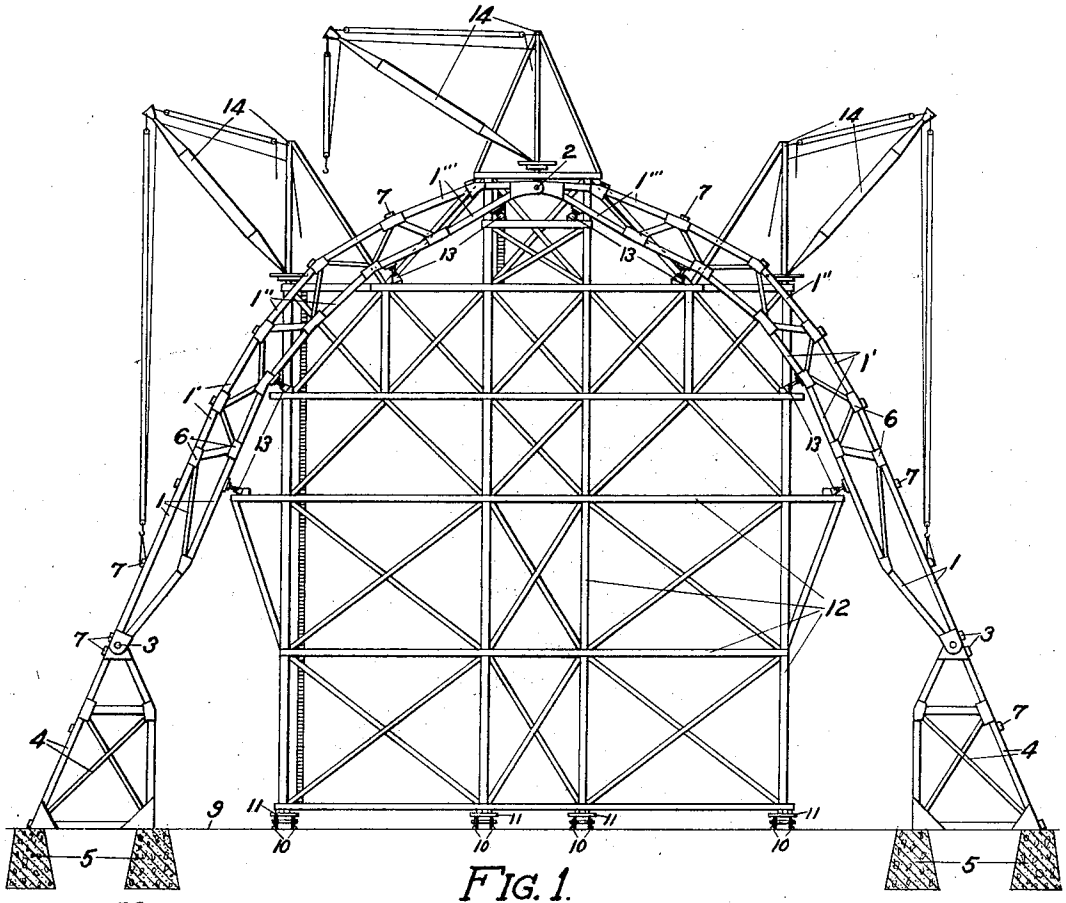


FIG. 1.

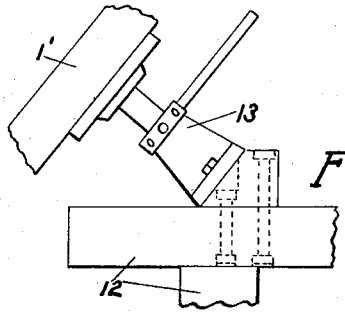


FIG. 3.

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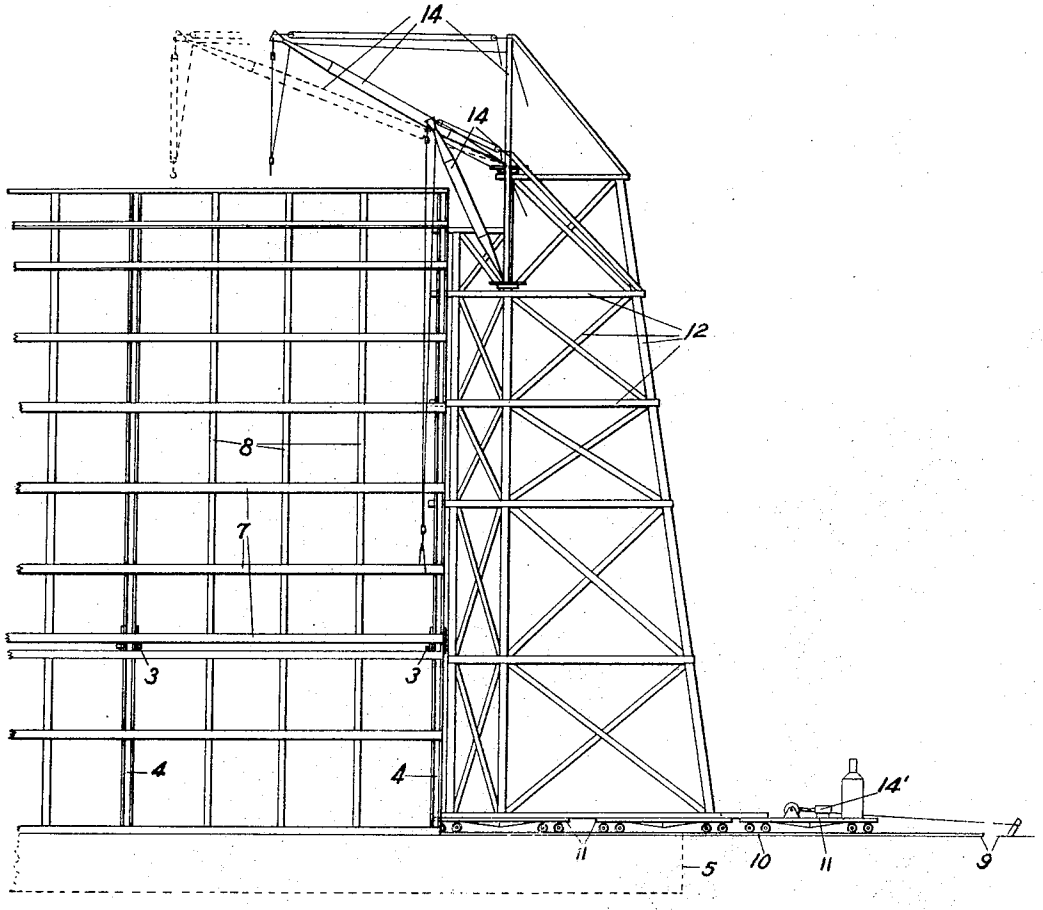


FIG. 2.

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APPARATUS FOR CONSTRUCTING LARGE HANGARS

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Application December 5, 1932. Serial No. 645,680

8 Claims. (Cl. 214—1)

This invention relates to the construction of large arched buildings such as dirigible airship hangars, and the objects of the invention are to provide a method as well as apparatus for constructing such buildings expeditiously and at a great saving of labor cost.

Large hangars for housing great airships such as the Akron are huge arched buildings comprising a series of transversely extending arches anchored at both ends to the ground and a skeleton framework supported by the spaced arches, and a covering of sheet metal, both ends of the structure being closed by huge rolling doors. The principal feature of my invention consists in apparatus which is moved along tracks for supporting and placing one arch after the other. Other features of the invention will appear in the following description and accompanying drawings.

In the drawings Fig. 1 is an end elevation of an arched hangar frame in process of construction with the aid of my apparatus.

Fig. 2 is a side view of a portion of the arched hangar frame constructed with the aid of the invention and the apparatus ready for moving outward for placing another arch.

Fig. 3 is an enlarged detail of one of the adjusting jacks for supporting the arch sections during erection.

The hangar depicted in the drawings shows the general construction of the great hangar at the United States Naval Air Station near Sunnyvale, Santa Clara County, California, the steel frame of which is about 1000 feet long and about 200 feet high, so it will be appreciated that the problem of expeditious erection solved by the present invention is no trivial matter.

In the drawings the main structural lines only are shown as the girders are all of lattice steel construction braced in all directions and it would be almost impossible to show all the details and would serve no useful end if done. The same applies to the construction of the "traveler" or traveling supporting framework used for erecting the arches.

Briefly described, the invention comprises erecting the giant arches one after the other by the aid of a specially devised supporting framework arranged to roll along on tracks, in fact in the present instance it is carried on twelve railroad flat cars on four lines of railroad tracks, three cars on each track. The framework is of a size to substantially conform to the interior of one of the main arches and the tracks run longitudinally of the proposed building so that as the framework is successively moved along to the successive arch positions it will be in the correct place to support the members or sections of each arch in erecting the same. The framework carries several overhanging boom cranes or derricks, its own power plant, and is provided with runways, platforms and ladders for the workmen to get to every point for handling the materials.

In the drawings the main arches of the hangar are composed of structural sections duplicated on both sides of the vertical center line of the arch and designated 1, 1', 1'', 1''', all firmly riveted together as at gusset plates 6, and the upper or central meeting point of the two sides of each arch are pivoted together with a large pin at 2 and the lower ends of sections 1 are pivoted at 3 to an A frame 4 in turn firmly anchored to permanent foundations 5. The main arches are spaced at intervals along the building and are connected by longitudinal beams or purlins 7 secured to which are intermediate arches or rafters 8 of lighter construction than the main arches, and besides the above main features of construction will be angular wind bracing in every direction and intermediate members for supporting sheet metal covering on the outside.

The pivotal connections 2 and 3, 3, are to provide for the expansion and contraction of the great mass of steel in the building through the effect of heat and permit the arches to open and close as it were without putting any strain on the foundations.

All the above relates to the actual construction of the building frame and is not involved in the present patent application which has only to do with the method and means for erecting such structures.

In erecting such structure falsework must of course be employed and it is the special type of falsework which so greatly expedites the work that the present case is directed.

In preparing to build the structure the foundations are poured and the ground 9 is leveled off between them and four sets of standard railway tracks 10 are laid longitudinally within the building area and spaced in a manner to support on flat cars 11, twelve being used in the present instance, a giant scaffolding or framework 12 suitably constructed and braced and with a wide base so as to stand firmly on the cars.

This framework is of a size substantially to conform to the interior of the main arches and is provided at numerous points with suitable adjustable members or jacks 13 which may be ex-

tended to meet and support the inner sides of the arch sections as indicated in Figs. 1 and 3, while at the top of the frame are several large boom cranes 14 the ropes of which run down to individual hoisting engines 14', carried on the lower forward part of the frame or on the cars, as the cars and frame are all anchored together in any suitable manner to hold them firmly together as a unit.

The cranes are positioned one in the center and two to the sides of the frame 12 but all somewhat forward as shown in Fig. 2 so as to preserve an unobstructed portion of the frame rearward of the cranes on which to support and erect the main arches in succession.

The crane booms are of a length to swing substantially from the preceding main arch already constructed to the last one supported on the frame so that all the members composing the main arches may be lifted one after the other, lowered against the jacks and riveted to the adjacent members. Most of the structural material is brought along inside of the building from the completed portion toward the end being worked on, the rail tracks serving to aid in this, and the pieces may be hoisted up through the partially completed building framework for placing in position. The cranes, however, will pick up material from the sides or from in front of the framework 12.

In erecting the building the A frames 4 are first bolted in place, members 1 are hoisted and pinned at 3 to the A frames and supported on the jacks, then successively members 1', 1'', 1''', are handled in the same manner, each firmly riveted at its lower end to the preceding member until both sides are in place, and by suitably manipulating the jacks the sockets or eyes at the upper ends of sections 1''' may be aligned and the upper pins 2 slid in place.

After a main arch is thus erected, the purlins 7 are hoisted and secured in place to tie the arch to the preceding portion of the building and after which the jacks or other supporting devices used in placing the arch members are released and backed away sufficiently to clear the frame at all points from the arch and the frame is then drawn along the tracks the correct distance for erecting the next arch in the same manner, and blocked in place or locked by the car hand brakes. In moving the frame forwardly it is preferable to use the power of the three hoisting engines simultaneously pulling on three lines extended forwardly to three deadmen. This has been found perfectly practicable with careful winchmen, instead of using a solid transverse winch shaft with several drums to pull so large a frame at several points simultaneously.

Having thus described my improvements in construction apparatus for erecting large arched structures, what I claim is:

1. Apparatus for constructing large buildings comprising scaffolding of a size to come within the cross section of the building and provided with means for supporting the transverse roof members of the building, means mounting said scaffolding for movement longitudinally of the building for successive placing of its transverse members, and a crane on said scaffolding overhanging the building for raising the construction material.

2. Apparatus for constructing large buildings comprising scaffolding of a size to come within the cross section of the building and provided with means for supporting the transverse roof members of the building, means mounting said scaffolding for movement longitudinally of the building for successive placing of its transverse members, and a plurality of spaced cranes on said scaffolding overhanging the building for raising the construction material.

3. Apparatus for constructing large buildings comprising scaffolding of a size to come within the cross section of the building and provided with means for supporting the transverse roof members of the building, means mounting said scaffolding for movement longitudinally of the building for successive placing of its transverse members, a plurality of spaced cranes on said scaffolding overhanging the building for raising the construction material, and a power hoist for said crane carried on the lower part of scaffold.

4. Apparatus for the construction of large arched buildings comprising scaffolding extending crosswise of the proposed building and provided with a portion coming within the arches of the building for supporting the arches during the erection of the same, ground tracks under the scaffolding extending longitudinally of the building, cars on the tracks carrying said scaffolding as a unit, a crane at the top of the scaffolding for lifting the construction material, and power means carried by the rolling assemblage for operating said crane.

5. Apparatus for the construction of large arched buildings comprising scaffolding extending crosswise of the proposed building and provided with a portion coming within the arches of the building for supporting the arches during the erection of the same, a plurality of parallel ground tracks under the scaffolding extending longitudinally of the building, a plurality of cars on each of the tracks all carrying said scaffolding as a unit, a plurality of cranes at the top of the scaffolding for lifting the construction material, and power means carried by the rolling assemblage for operating said cranes.

6. Apparatus for constructing large buildings comprising scaffolding of a size to come within the cross section of the building, said scaffolding provided with means for supporting the transverse roof members of the building, a boom-type crane mounted on said scaffolding arranged and adapted for raising the transverse roof members and placing them on the means provided on the scaffold for supporting the roof members, and means mounting said scaffolding for movement longitudinally of the building for successive placing of its transverse members.

7. In apparatus as defined in claim 6, said means for supporting the transverse roof members being disposed in a vertical plane positioned at one side of the mounting of the crane.

8. In apparatus as defined in claim 6, said means comprising spaced supporting members generally disposed in a vertical plane at one side of the mounting of the crane, and positioned to generally conform to spaced points along the inner cross sectional contour of the building.

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