

July 20, 1943.

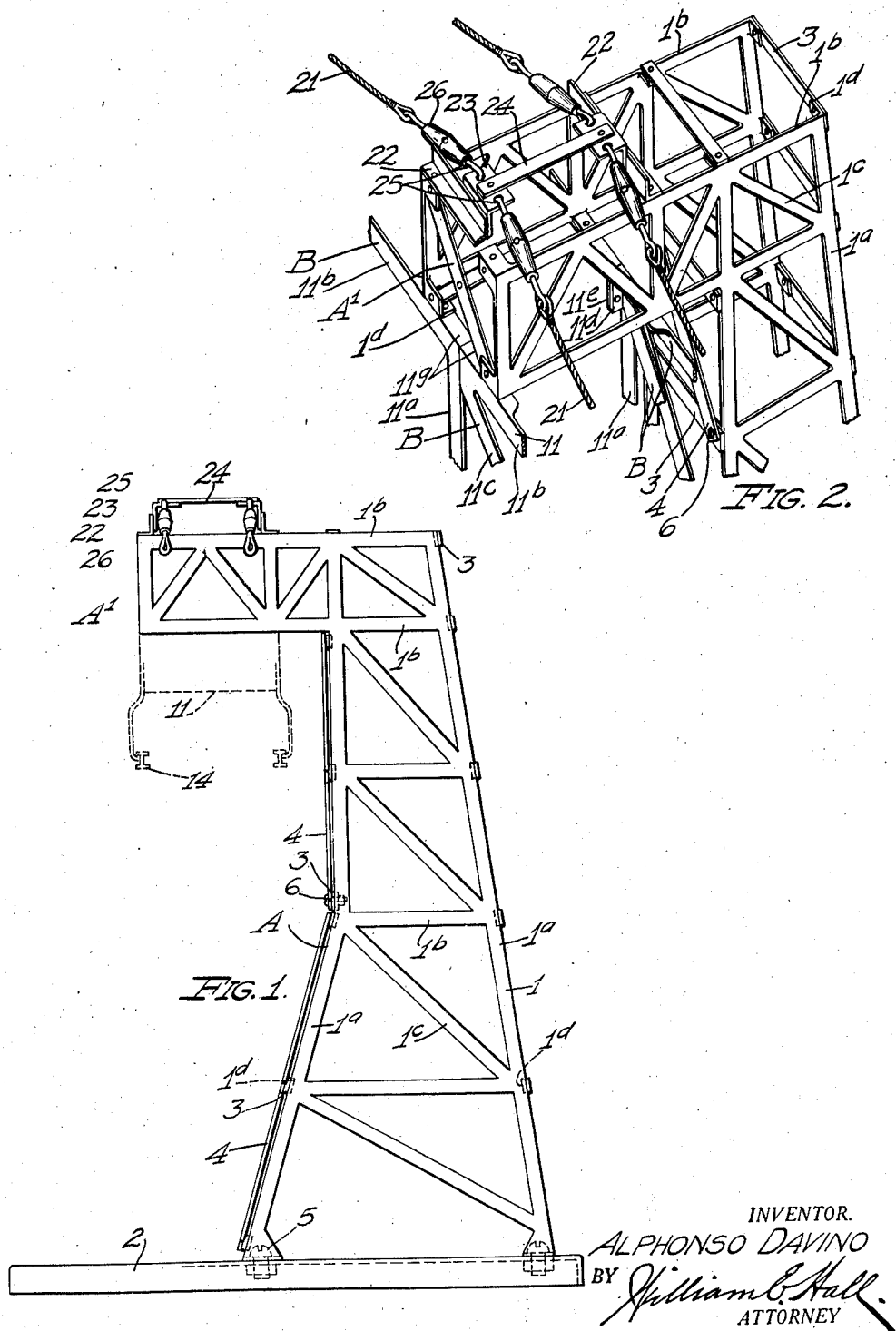
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2,324,487

AERIAL RAILWAY APPARATUS

Filed May 3, 1937

4 Sheets-Sheet 1



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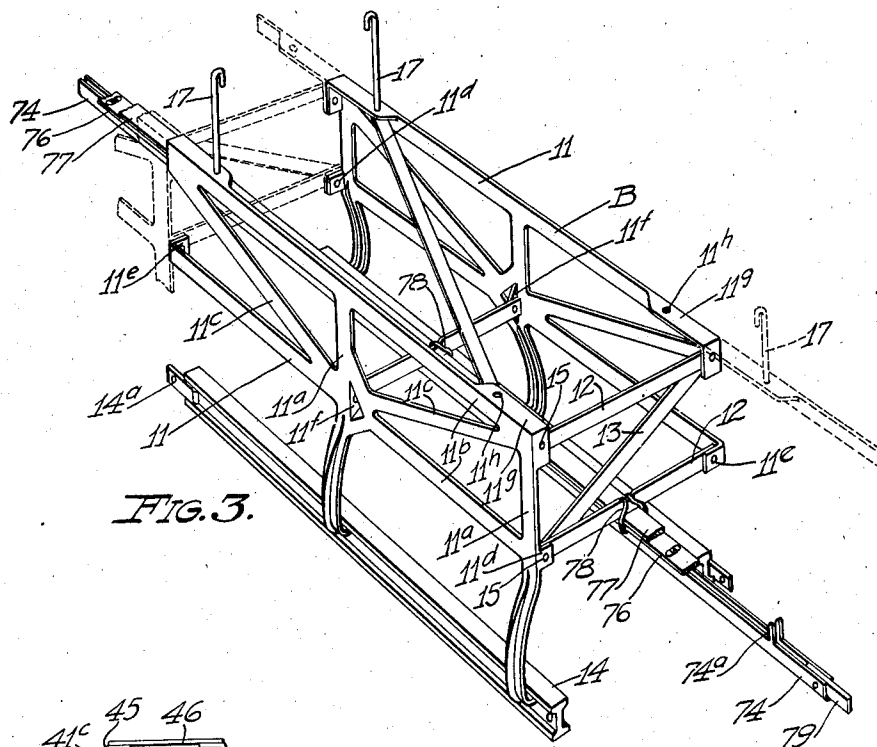


FIG. 3.

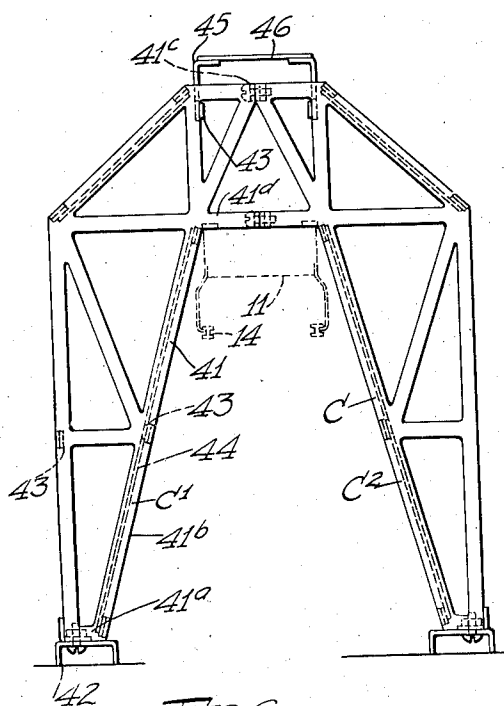


FIG. 6.

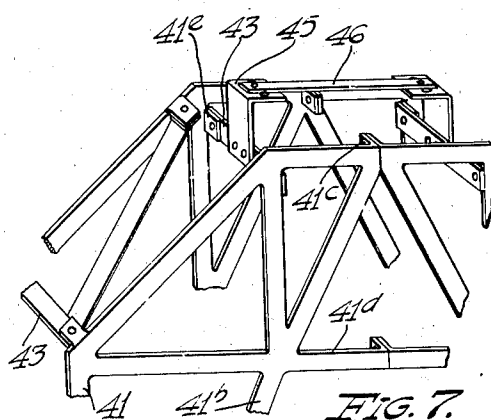


FIG. 7.

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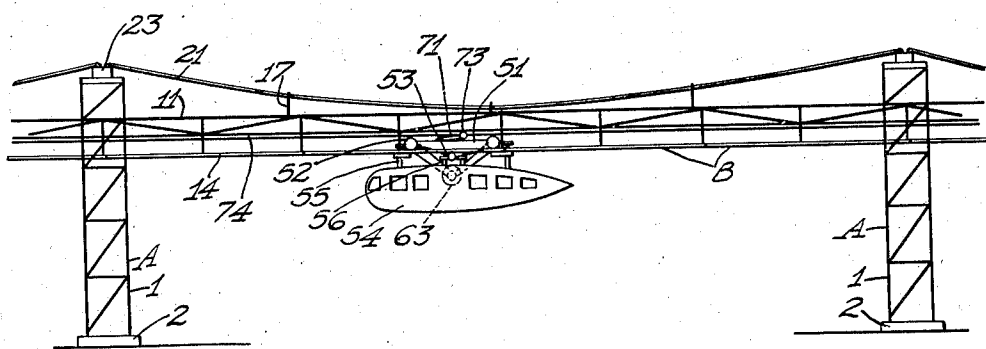
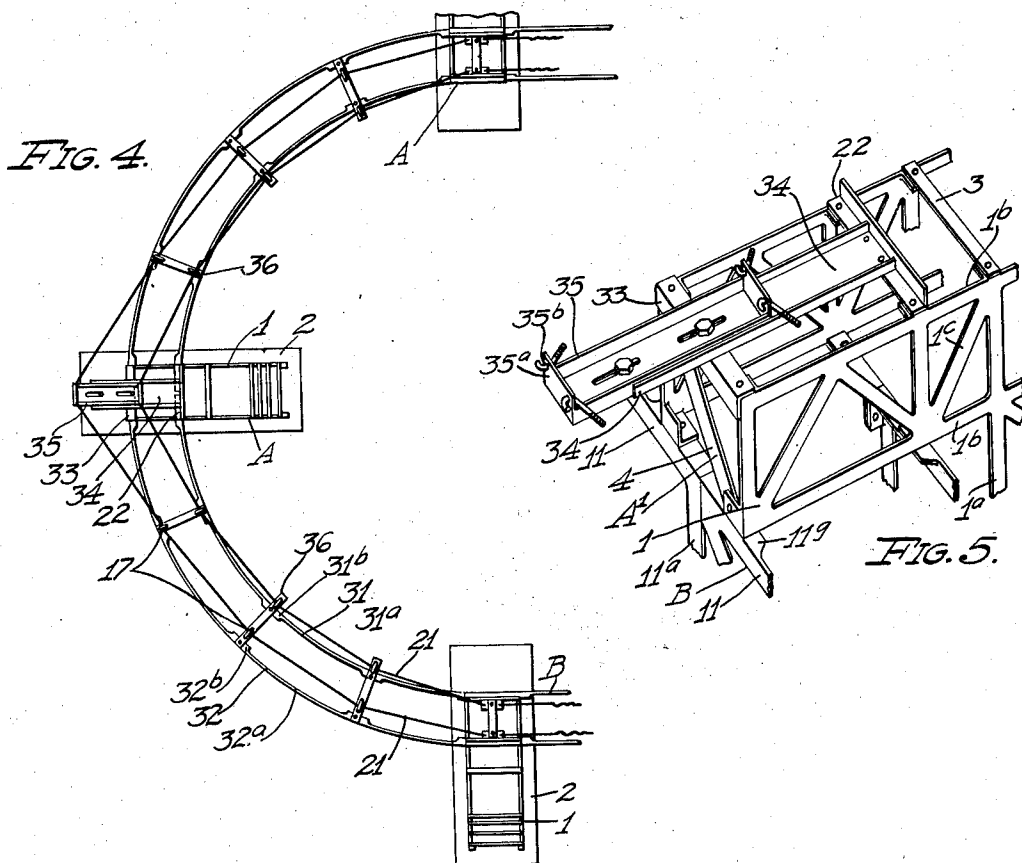


FIG. 8.

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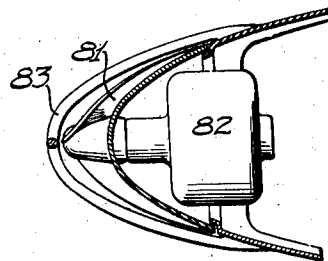
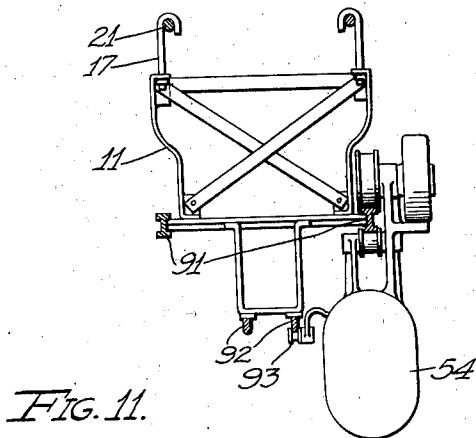
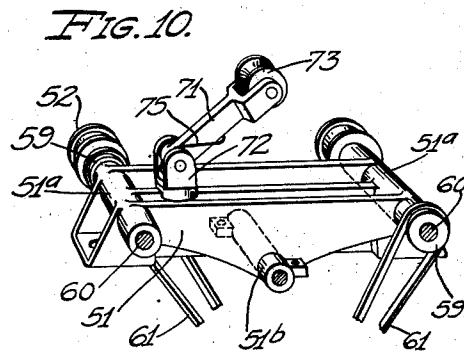
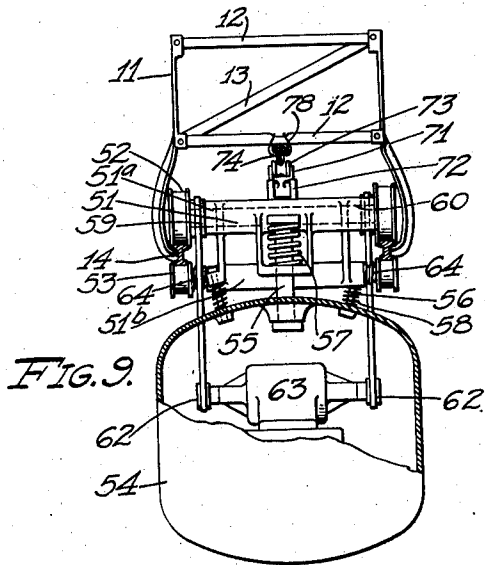
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2,324,487

AERIAL RAILWAY APPARATUS

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Application May 3, 1937, Serial No. 140,366

6 Claims. (Cl. 104—124)

My present invention relates to educational toys for the erection of structures, and particularly for the erection of aerial railways and the like.

One of the principal objects of this invention is the provision of a toy of this class whereby an extensive structure may be made with relatively fewer parts than would normally be required for such a structure.

Another important object of this invention is the provision of building elements of economical construction for erecting a relatively extensive construction of this class.

A further important object of this invention is the provision of such building elements which may be readily and economically packed in convenient cartons.

Still another important object of this invention is the provision of building elements which facilitate erection and prescribe to some extent the form and building principles to be followed.

Another object of this invention is to provide novel tower and rail supporting truss construction.

A further object is to provide novel rail truss suspension means and novel means of securing the trusses to the tower.

A still further object is to provide a novel carriage construction and novel mounting for the cabin thereon.

With these and other objects in view, as will appear hereinafter, I have devised an educational toy of the class mentioned and one having certain novel features of construction, combination and arrangement of parts and portions, as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings and to the characters of reference thereon, which form a part of this application, in which:

Fig. 1 is a side elevational view of a preferred form of a supporting tower of my toy aerial railway;

Fig. 2 is a fragmentary perspective view showing the same supporting a track truss;

Fig. 3 is a perspective view showing a track supporting truss section;

Fig. 4 is a plan view showing a curve construction for the track of my toy aerial railway;

Fig. 5 is a fragmentary perspective view of the cantilever portion of the tower employed at the curve portion of the track;

Fig. 6 is a front elevation of a modified form of supporting tower;

Fig. 7 is a fragmentary perspective view thereof;

Fig. 8 is a fragmentary side elevational view of one span of the aerial railway;

Fig. 9 is a sectional elevational view of the track supporting truss, and one form of carriage and cabin supported thereon;

Fig. 10 is a perspective view of the carriage frame;

Fig. 11 is a sectional view of a slightly modified form of the track supporting truss and of the cabin or car suspended therefrom and,

Fig. 12 is a longitudinal sectional view of the front end of the cabin, showing particularly the propeller at the front end and the guard therefor.

One form of supporting tower, designated A, I have shown in Figs. 1 and 2. This tower, in a preferred form, consists of side members 1, a base 2, cross or tie members 3, and diagonals 4. The side members are shaped in the general side outline of the tower, and are preferably punched from one piece, the uprights 1^a, cross members 1^b and diagonals 1^c simulating the corresponding members on a structural steel tower. The two upper cross members 1^b of each side member extend laterally at considerable distance to form a cantilever or overhanging tower portion, designated A1. The bases of the uprights are anchored in or secured by bolts 5 to the base 2, which is a plate. The center of the rail supporting truss, which is to be supported from the overhanging portion of the tower, as will be described hereafter, preferably falls within the base of the tower, and is positioned particularly over the base 2.

The cross members 3 and diagonals 4 are secured, by bolts 6, to inwardly bent lugs 1^d on the tower side members 1. Diagonals or diagonal braces 4 are preferably provided only on the inner or track side of the tower and on the underside of the cantilever or overhanging portion A1.

The rail supporting truss is composed of identical sections B, there being several sections to each span between adjacent towers. These sections, like the towers, have the opposite long sides formed of single pieces 11 which are connected laterally by cross or tie members 12 and diagonals 13.

Each side member 11 is formed or pressed of a single piece and has preferably two uprights 11^a, two stringers 11^b and diagonals 11^c. One upright is provided at one end and another intermediate the ends, as shown in Fig. 3.

The lower ends of the uprights, which I have termed arms, are outwardly off-set and then bent

inwardly. To and over the ends of the arms is cast a rail section 14 of I-shaped cross-section. One end of each rail section 14 has a longitudinally extended lug 14^a at the outer side of the web for securing abutting sections together. The rail sections 14 are equal in length to the truss side members 11 but are offset with respect to the same, the end, coincident with the end of the side member 11 having the depending arm, extending beyond the end of said side member 11. Such construction applies to the straight sections, shown in Fig. 3, as well as to the curved sections to be described hereafter.

It is important to the economy and to the ease of erection of my structure that the opposite side members 11 of each section be duplicates and be readily interchangeable.

These truss sections are secured together by bolts 15 extending through inwardly bent lugs 11^d and 11^e at the ends of the stringers 11^b. These bolts also fasten the tie members 12 and diagonals 13 to the inner sides of the lugs 11^d of the side members. The tie members, intermediate the ends of the sections B may be fastened to ears 11^f bent inwardly from the side members.

The opposite end portions of the upper stringers are provided with inwardly directed flanges 11^g having holes 11^h. Bolts 16 are adapted to secure the rail supporting truss sections through the holes 11^h to the inwardly bent lugs 14 at the lower side of the overhanging portion A1 of the tower. These holes 11^h are also adapted to receive the hook bolts 17 for supporting the rail supporting truss from the suspension cables 21, to be described hereafter. The flanges 11^g and the holes 11^h are so arranged that the side members 11 may be interchanged readily and secured either to the towers or suspended from the cables, and so that the suspending means from the cables may be positioned directly opposite each other.

The suspension cables 21, there being preferably two suspended between adjacent towers, are adjustably secured at their ends above and to the middle portions of the overhanging or cantilever portions A1 of the towers. Instead of merely flat straps for cross or tie members at the upper side of the cantilever portion, I have provided angle members 22 which are provided intermediate their ends with angle clips 23, which clips, at the opposite sides of the span may be reinforced by the straps 24. The cables 21 are connected by hooks 25 to the opposite edge portions of the angle clips 23, as shown best in Fig. 2. One end of the cable may be provided with a turn buckle 26 for adjusting the tension of the cable. The hooks 17 are merely hooked over the cables 21 near the joined ends of the truss sections.

When providing for curves or bends in the track, the curved portion of the track is also made in sections, constructed similarly to the straight sections previously described. In Fig. 4 of the drawings, I have shown a curve made up in two 90° sections. The radially inner and outer side sections 31 and 32 are constructed similar to the side members 11, described above, but are of different curvature from each other. They may also be made longer in longitudinal or circular extent, as shown. If the curved section is longer than the sections B, described above, the stringers or members 31^a and 32^a, at the upper portions of the side members, are provided intermediate their ends with inwardly turned flanges 31^b and 32^b to which are secured radially extending cross straps 36 to which are variously secured the truss supporting hooks 17.

In the event of curved portions in the track system, the towers A are preferably positioned at the radially inner sides of the curves, whereas the towers may be placed on either side in straight portions of the track. The cable supporting means on the towers employed at the curves is slightly different from that described above. In the latter case the flange of the supporting angle at the outer end of the cantilever portion is turned downwardly, as indicated by 33 in the drawings. On this angle member is secured a strap 34, which is also secured at its inner end on the angle member 22, and extends with its other end considerably beyond the cantilever portion of the tower, as shown in Fig. 5. On this strap 34 is adjustably mounted a bracket 35 which has its opposite ends turned upwardly, forming flanges 35^a in which are holes 35^b, into which the cable members 25 are hooked. Thus, the cables at the curved portions of the track are supported greater distances outwardly than in the straight construction.

In Fig. 6 of the drawings, I have shown a modified form of a track supporting tower, designated C, in the form of an arch. This arch is formed in two parts, C¹ and C², joined at the top or apex of the arch. In this instance, each part also consists of opposite side members 41, formed similar to side members 11 of the tower described above. In this instance the lower ends 41^a of the side members are narrow and supported upon angles 42 which secure together the opposite side members of each half. The inner uprights, designated 41^b, are arranged angularly and extend to the extreme upper portion of the tower, where the corresponding members of opposing halves are joined together, as indicated at 41^c. These side members are also provided with lateral members 41^d which are joined with the corresponding member of the opposing half. In this instance also are provided tie members 43 and diagonals 44. The diagonals are preferably only employed at the inner side of the arch.

The upper portions of the side members are provided with inwardly extending lugs 41^e which are connected by straps 43, positioned edgewise. To the latter straps 43 are secured angle clips 45 which are reinforced with respect to each by a strap 46. The suspension cables are hooked to the angle clips 45 in the manner described above. The rail supporting truss is supported in like manner by the tower C just described.

In Figs. 8, 9 and 10 of the drawings, I have shown a carriage frame 51, which may be constructed substantially as shown. It consists essentially of forward and rear journals 51^a for supporting wheels 52 to ride on top of the rails, and a journal 51^b intermediate and in a plane below the former for supporting or retaining the wheels 53 adapted to engage the underside of the rails of the track. The cabin or car 54 is suspended from the carriage frame 51, preferably by a four point suspension. The suspension means may consist of hangers or bolts 55 at the front and rear ends of the carriage, and hangers or bolts 56 at the opposite lateral sides of the longitudinal axis and intermediate the ends of the carriage. Between the carriage and the upper ends of the bolts 55 are compression springs 57 for carrying the weight of the cabin or car. Also between the carriage and the upper portions of the cabin or car are other springs 58 for absorbing the lateral shock, or for permitting the cabin to sway or bank easily, particularly when making a curve.

In the preferred construction, I have provided drive sheaves 59 on the front and rear axles 60 which support the carrying wheels 52. These drive sheaves are driven by belts 61, which extend around sheaves 62 driven by a motor 63 carried by and within the cabin 54. The drive between the motor 63 and the drive wheels 52 may be in any other suitable manner known to those familiar with such construction.

In order to permit the carriage to pass freely around curves, I have mounted the retaining wheels 53 upon an axle or spindle 64 which is laterally shiftable and is retained in a central position by springs 65 suitably arranged in connection with the spindles 64.

On the carriage I have also provided a trolley arm which is pivotally mounted on an insulating bracket 72. At the free end of the trolley arm is a trolley wheel 73 which is resiliently held in engagement with a trolley or track 74 by means of a spring 75 arranged resiliently to force the free end of the trolley arm upwardly.

The trolley or charged track 74 may be of narrow U-shape and provided with upwardly extending projections 74^a at the upper edges of its opposite sides. These projections may extend through holes in an insulating strip 76. Above the insulating strip 76 may be another insulating strip 77. This trolley is secured against the lower edge of the lower cross members 12 of the truss sections B, and preferably by spring clips 78 which engage the opposite edges of the insulating strips and extend around the upper edges of the cross members 12, and are preferably seated in notches 12^a therein.

The ends of the trolley or track 74 may be spliced by dowel members 79, one end of which is secured in one end of one trolley section and the other end of which may extend into the abutting end of the other trolley section.

The drive means for the cabin or car may, of course, consist of a propeller 81, and may be carried at the forward end of the cabin or car, which propeller may be driven by a motor 82, also carried at the forward end of the cabin, and deriving its power from a trolley, as described above. The propeller, in this instance, consists of a series of spirally arranged vanes 81^a extending from a rotating drum 81^b. This propeller is encaged in a suitable guard 83.

In Fig. 11 of the drawings, I have shown a slightly modified form of rail or track construction. In this modification the rail 91 is positioned laterally outward from the lower portion of the truss. In this construction, a single carriage and car may be supported on the two rails at the opposite sides of a truss. Or, one carriage and car may be supported or suspended on each rail, as shown in the drawings. If desired, the trolley 92 may be located at the side of the car, and the trolley wheel 93 yieldingly mounted at the side of the car.

Though I have shown and described a particular construction, combination, and arrangement of parts and portions, and certain modifications thereof, and have specifically applied the various features to an educational toy, I do not wish to be limited to the same, but desire to include in the scope of my invention, the construction, combination, and arrangement, substantially as set forth in the appended claims, certain features being claimed broadly to include structures other than toys.

I claim:

1. In an educational toy of the class described, a plurality of towers and truss sections, each comprising opposite side members and transverse tie members, each side member formed of a single piece simulating a fabricated steel frame, the tie members securing together the respective side members in spaced relation to simulate wholly fabricated steel towers and truss sections, two sections being butted end to end and secured with said abutted ends to a single tower, pairs of cables adjustably suspended between adjacent towers, and hooks securing the truss sections to the cables at the end portions of the sections.

2. In an aerial railway structure, a tower comprising a column and a cantilever truss at the upper portion of the column, carriage supporting tracks depending from the laterally extended portion of the cantilever truss, the center of the tracks falling within the base of the column, suspension cables, and means supporting the cables from the upper side of the laterally extended portion of the truss, said means being adjustable longitudinally with respect to the laterally extended portion of the cantilever truss.

3. In an educational toy of the class described, an arched track supporting tower constructed in equal halves divided at the top of the arch, each half comprising similar opposite side members, each formed of a single piece simulating a structural steel frame, and tie members transversely securing said side members together in spaced relation, the side and tie members, when secured together, simulating a wholly fabricated structural steel tower.

4. In an educational toy of the class described, a rail supporting truss comprising opposite side members, each formed of a single piece simulating a structural steel frame, said side members having outwardly offset depending bracket arms, a rail moulded to the lower ends of the arms of each side member, and tie members transversely securing the former together in spaced relation to simulate a wholly fabricated structural steel truss.

5. In an educational toy of the class described, a rail supporting truss comprising identical opposite side members, each formed of a single piece simulating a structural steel frame, said side members having outwardly offset depending bracket arms, a rail moulded to the lower ends of the arms of each side member, and tie members transversely securing the former together in spaced relation to simulate a wholly fabricated structural steel truss, said rails being of the length of the side members but off-set longitudinally with respect thereto, the rails of the opposite side members being oppositely off-set relative to each other.

6. In an educational toy of the class described, a rail supporting truss comprising identical opposite side members, each formed of a single piece simulating a structural steel frame, a rail depending from the lower portion of each side member, and tie members transversely securing the latter together in spaced relation to simulate a wholly fabricated structural steel truss, said rails being of the length of the side members but off-set longitudinally with respect thereto, the rails of the opposite side members being oppositely off-set relative to each other.

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