March 5, 1968 L. G. STURGILL 3,371,458

STRUCTURAL UNIT

Filed June 30, 1966

Fig. 1

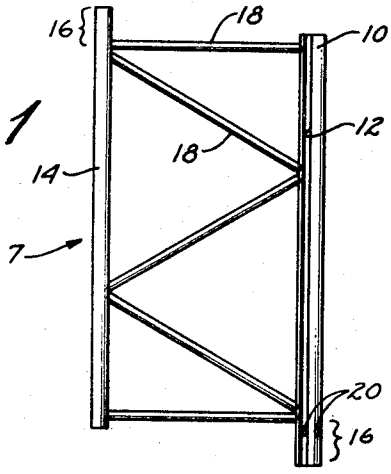


Fig. 2

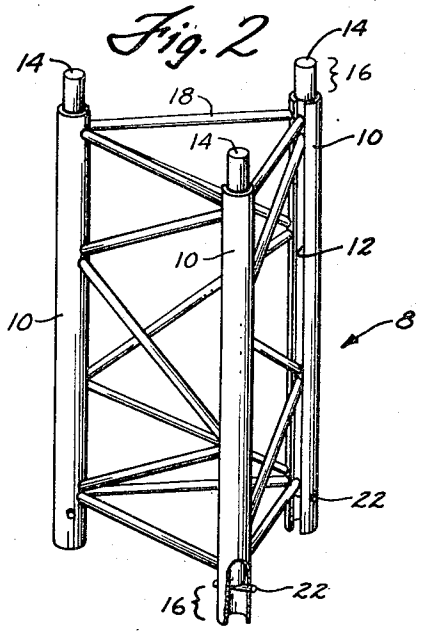


Fig. 5

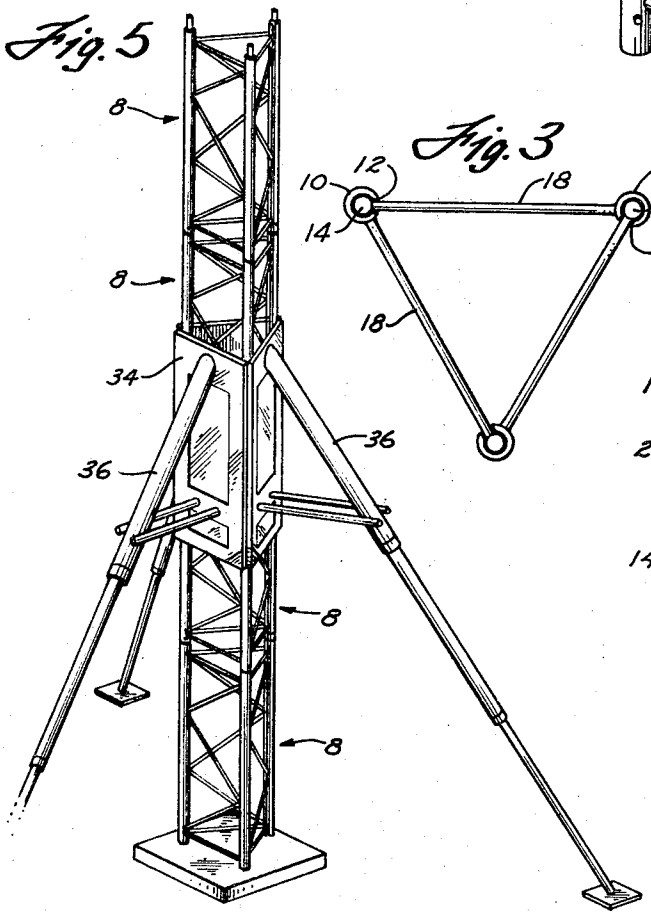
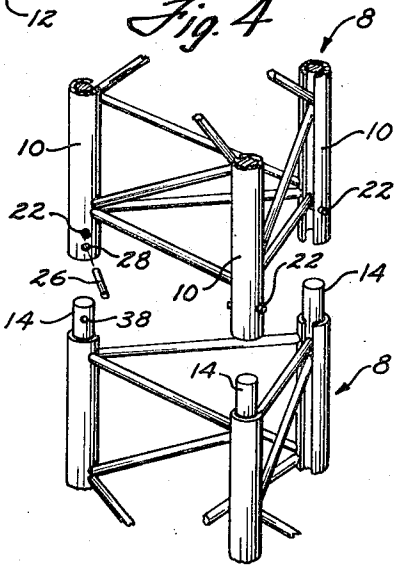


Fig. 3

Fig. 4



INVENTOR

LESTER G. STURGILL

BY Neal E. Abrams

AGENT

United States Patent Office

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STRUCTURAL UNIT

Lester G. Sturgill, Leesburg, Va., assignor to Atlantic Research Corporation, Fairfax County, Va., a corporation of Virginia

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10 Claims. (Cl. 52—648)

This invention relates generally to structural units, and more particularly to structural units composed of a plurality of interconnected sections of identical configuration, and a tower constructed therefrom.

There are many applications for light-weight, easily assembled and erected towers for electronic emissions and the like. A preferred form of construction is of a plurality of individual structural units. Since it is advantageous to construct a tower of a plurality of identical structural units having a minimum of brace and fittings, many of the prior-art towers advance this concept, most setting forth a four-sided basic unit. A major problem with four-sided structural units, and consequently with towers constructed therefrom, is that a four-sided shape is not inherently rigid without the addition of cross-braces, and the use of cross-braces defeats the idea of having identical members with few extra parts; thus the construction of the tower is greatly complicated.

Briefly stated, the instant invention presents an inherently rigid, easily assembled and disassembled structural unit of triangular configuration and a tower constructed using a plurality of such units. Each unit is readily assembled and disassembled and is composed of three identical sections. Each section comprises a hollow tube with a slot along its entire length, a second hollow tube or solid rod of diameter less than that of the first hollow tube, and means for attaching the slotted tube and the rod together, such as a plurality of struts, a single plate, or the like. The struts are welded between the tube and rod to construct a rigid section and are attached to the slotted tube at an angular distance of 60° from the slot. A unit of the tower is constructed of three sections by sliding the rod of each section into the tube of an adjoining section such that the struts of the first pass through the slot of the second. Each of the rods is parallel to, but longitudinally slightly offset from the tube. A pin in the bottom of each hollow tube supports the rod, and when the second unit is placed upon the first, the rod protrudes up into the tube above to support the upper unit. Such a design facilitates the construction of a tower.

It is an object of this invention to provide a structural unit which is inherently rigid and easily assembled and disassembled.

Another object of this invention is to provide an erectable tower constructed of a plurality of identical units which are easily and quickly assembled and disassembled.

Other objects and advantages of the present invention will be come obvious from the following detailed description when considered with the accompanying drawings, wherein:

FIGURE 1 is a side view in elevation of a single section of the structural unit of the instant invention;

FIGURE 2 is a perspective view of three of the sections of FIGURE 1 assembled to form the structural unit of the invention;

FIGURE 3 is a plan view of FIGURE 2;

FIGURE 4 is a perspective view of the joining of two of the units of FIGURE 2; and

FIGURE 5 is a perspective view of a means for raising the units of FIGURE 2 to construct a tower.

As shown in FIGURE 1, a single section 7 of the structural unit consists of a tube 10 having a slot 12 along its entire length. Spaced laterally from the tube

and parallel thereto is a rod 14 of diameter slightly less than tube 10. Although described herein as a rod this particular element may also be a hollow tube and still be within the purview of the instant invention. Rod 14, although parallel to tube 10, is not aligned longitudinally therewith but is offset a distance 16 along the parallel axes. The reason for this offset 16 will hereinafter be explained. To attach tube 10 to rod 14 there is shown a series of struts 18, which are welded at one end to tube 10 at an angular distance of 60° from the slot 12 and at the other end to rod 14. Although these connecting members are shown as a series of struts, there could be a single member such as a plate, or various other arrangements of struts or like supporting members. At the lower or offset portion, tube 10 can be provided with at least two aligned poles 20 which are adapted to receive a bolt or rod which will support rod 14 being inserted into tube 10.

FIGURE 2 shows a complete structural unit 8 assembled from three of the sections described above, and FIGURE 3 a plan view of said unit. A unit is constructed by inserting rod 14 of one section into tube 10 of another section such that the struts 18 project through slot 12. The addition of a third element in like fashion completes the unit. Pins 22 are then inserted through cooperating holes 20 to support each of the rods 14 and thus a rigid inter-locking unit is provided. Holes 20 can, as an alternative not shown, be placed near the middle of tube 10, and then rod 14 equipped with a cooperating hole such that tube 10 in rod 14 can be pinned together. The offset of rod 14 from tube 10 by distance 16 provides that a section of each of the rods of the unit will protrude above the top of the tubes and therefore will fit into the lower portion of the tubes in the above section to interlock and provide support for this upper unit.

In FIGURE 4 there are shown two juxtaposed structural units. Assembly of an entire tower is provided by placing the offset portions of each of the rods 14 of one unit into the offset portion of the tubes 10 of the adjacent unit. If increased rigidity is necessary, a second series of bolts 26 can be placed through a second set of aligned holes 28 in the bottom portion of tubes 10, these also going through a cooperating hole 30 in the offset section of each of the rods 14.

A preferred means and method for constructing a tower is shown in FIGURE 5. A tower launcher 34 of triangular shape is mounted on legs 36, and a tower is constructed by pushing assembled structural units 8 up through launcher 34, fitting each new section in below as shown in FIGURE 4. The use of this method of erecting a tower is particularly advantageous when in close quarters or in an environment such as a jungle in which a heavy cover of foliage above the ground precludes more conventional erecting procedures such as guy wires or cranes.

The structural unit provided by the instant invention is rigid and is easily assembled. The fact that it consists of three identical elements and a minimum of small parts adds to its attractiveness since it lessens the difficulties encountered in packing and shipping as well as minimizes the supervision and instruction necessary to those who assemble the units on location. Each of the sections of the individual unit is of simple construction and is easily manufactured from stock parts. The use of the geometric form of a triangle means that the structural unit is inherently rigid, in cross-section, and once the three locking pins 22 are installed, all three sections 7 of unit 8 are rigidly locked against longitudinal movement and cannot be separated until the pins are removed. In addition, maximum ability to endure the stresses and strains of the types of loading encountered in tower constructions is provided by the fact that each hollow tube has a rod

or second tube inside to strengthen it and to prevent it from bending and collapsing. The fact that the structural units interlock means that external forces are smoothly and evenly transmitted throughout the unit and the tower.

Obviously many modifications and variations of the present invention are possible in the light of teachings. It is, therefore, to be understood that in the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed as new and desired to be secured as Letters Patent of the United States is:

1. A structural unit for building an elongated structure comprising a first section, a second section, and a third section, all of said sections being of identical configuration and each of said sections comprising:

a hollow tube having a first diameter,

a rod laterally spaced from and parallel to said tube, said rod having a second diameter less than said first diameter,

a slot longitudinally aligned through said tube and traversing the entire length thereof, said slot having a width less than said second diameter,

means for attaching said rod to said tube, said means being fixedly attached at one end to said rod and at the other end to said tube at an angular distance of 60° from said slot;

the rod of said first secion being inserted into the tube of said second section such that the attaching means of said first section pass through the slot of said second section; the rod of said second section being inserted into the tube of said third section such that the attaching means of said second section pass through the slot of said third section, and the rod of said third section being inserted in the tube of said first section such that the attaching means of said third section pass through the slot of said first section.

2. A structural unit in accordance with claim 1 further comprising means for restricting movement of each of said rods with respect to said tube into which it is inserted.

3. A structural unit in accordance with claim 2 wherein said means for restricting movement comprises bolt means extending through each of said tubes.

4. A structural unit in accordance with claim 1 wherein said means for attaching said rod to said tube comprises a plurality of struts.

5. A structural unit in accordance with claim 1 wherein said rod and said tube are of equal length and said rod is offset longitudinally with respect to said tube.

6. A structural unit in accordance with claim 5 further comprising means for restricting movement of each of said rods with respect to said tube into which it is inserted.

7. A structural unit in accordance with claim 5 wherein said means for attaching said rod to said tube comprises a plurality of struts.

8. A tower comprising a plurality of structural units in accordance with claim 6, said units being assembled such that the offset portion of each of said rods in one unit is inserted into the offset portion of each of said tubes in another unit.

9. A tower in accordance with claim 8 further comprising means for locking adjacent of said units together.

10. A tower in accordance with claim 9 wherein said means for locking adjacent of said units together comprises pin means extending through said offset portion of said rods and said offset portion of said tubes.

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BOBBY R. GAY, *Primary Examiner.*

ANDREW M. CALVERT, *Assistant Examiner.*