Sept. 20, 1971 F. BADER ET AL 3,605,359

ANTENNA MAST CONSTRUCTION

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FIG. 1

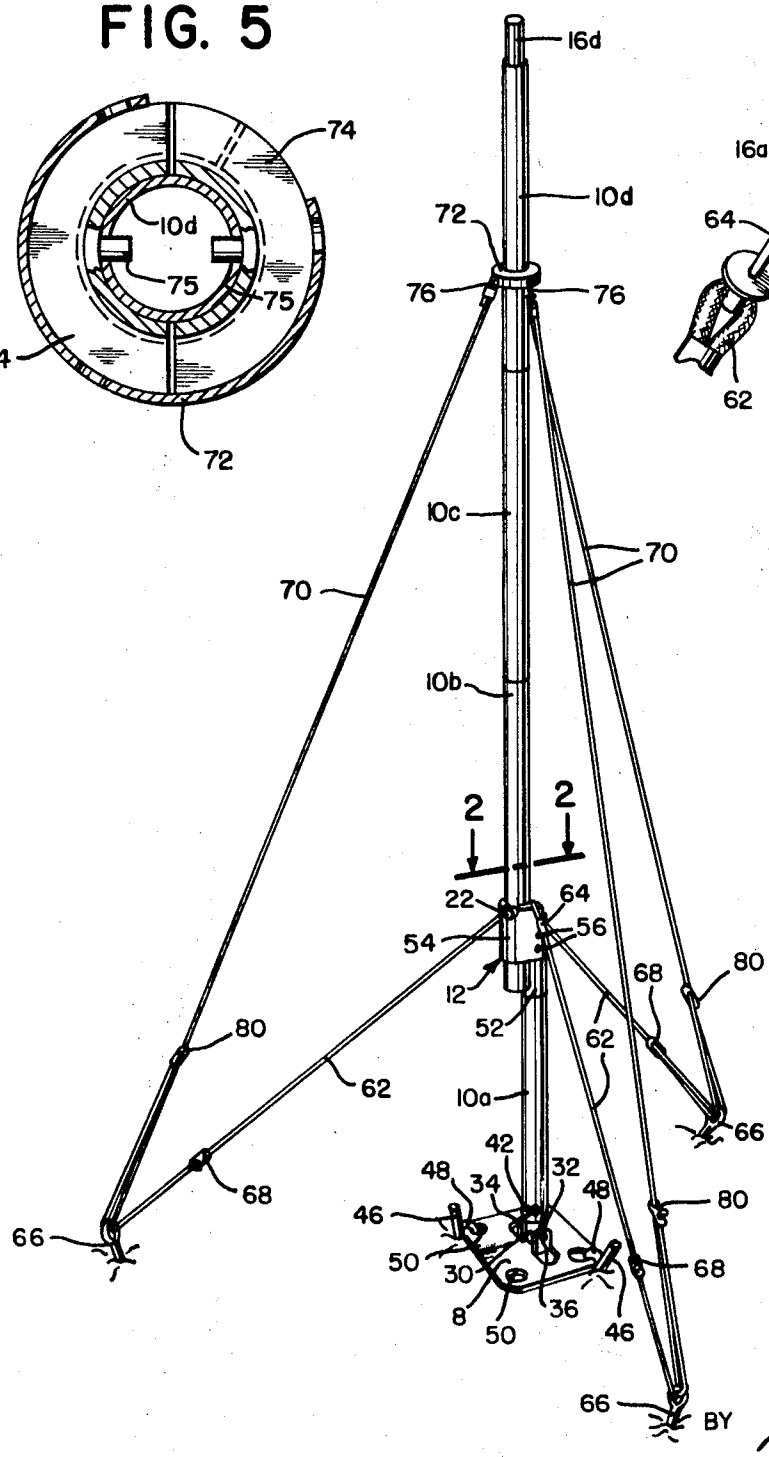


FIG. 2

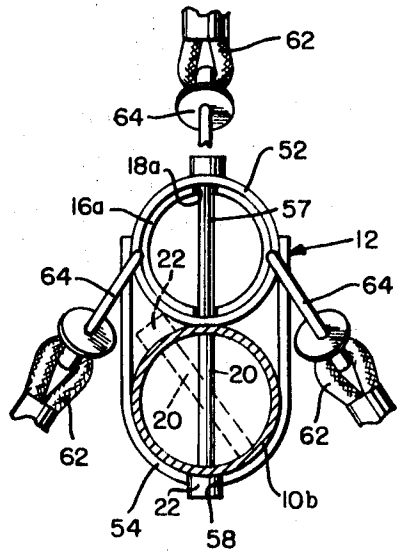
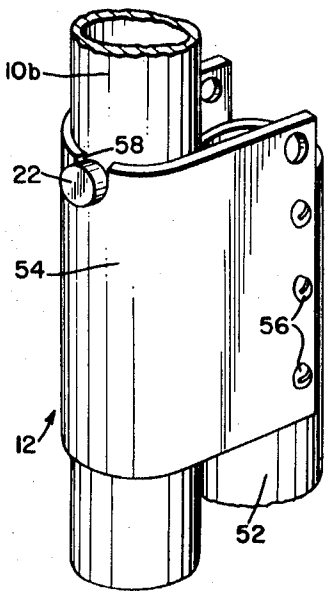


FIG. 5

FIG. 7



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FIG. 3

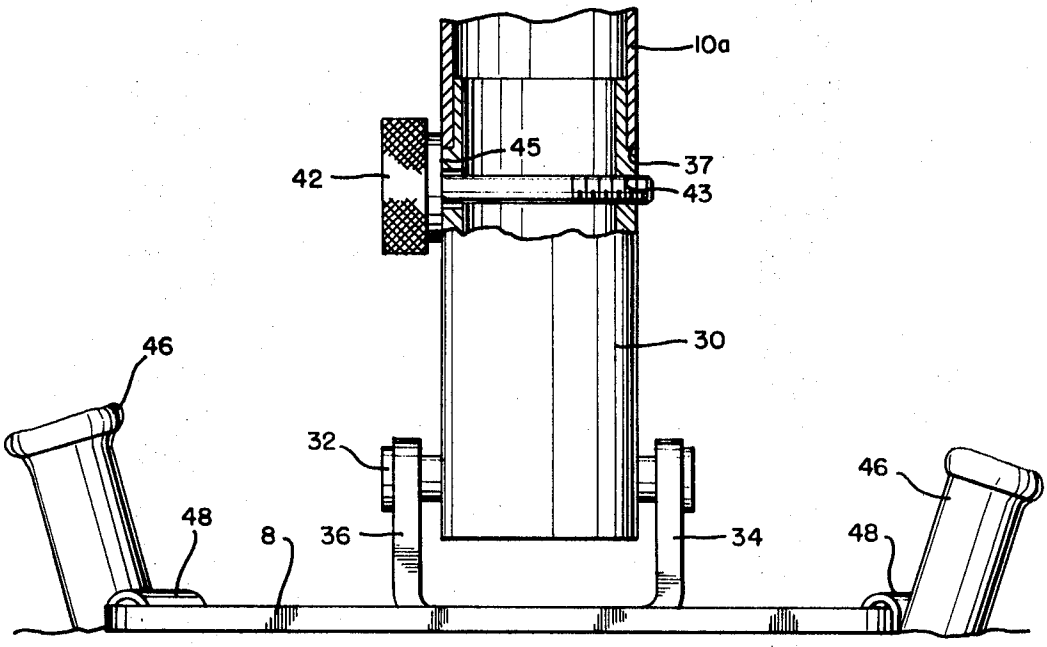


FIG. 4

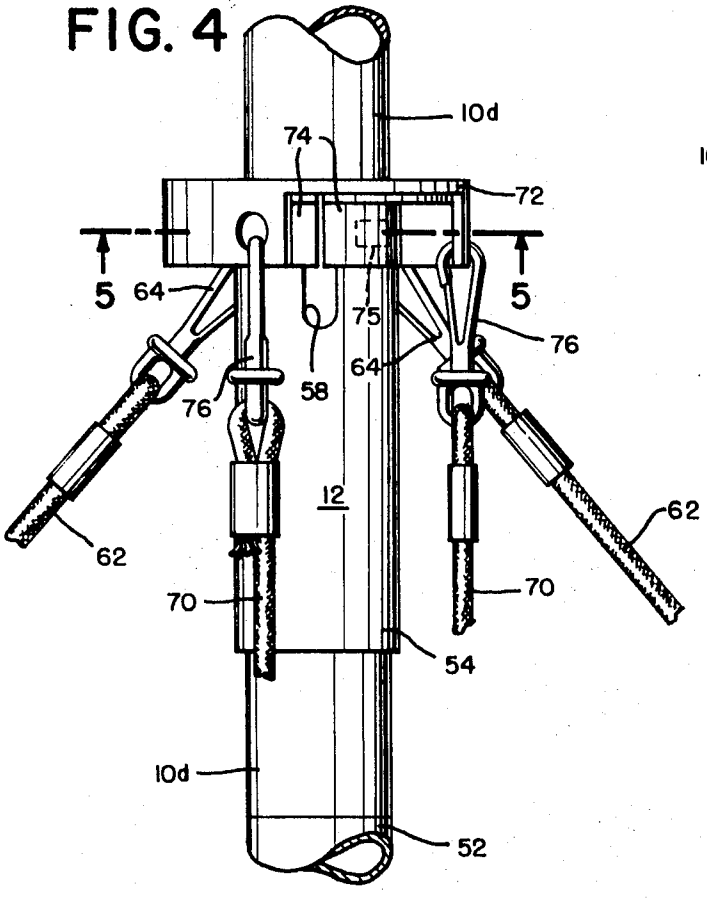
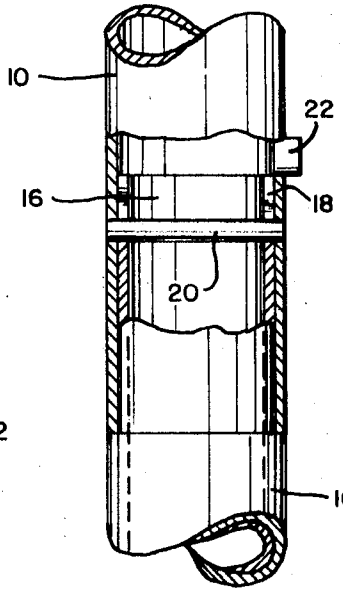


FIG. 6



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ANTENNA MAST CONSTRUCTION

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Int. Cl. E04h 12/08, 12/20
U.S. Cl. 52—146 4 Claims

ABSTRACT OF THE DISCLOSURE

An antenna mast including a plurality of tubular mast sections and a vertical launch attachment adapted to be installed upon the lowermost mast section. The attachment comprises a bracket through which the remaining mast sections are sequentially inserted and locked to vertically "launch" the mast to a desired height. These mast sections are held on the launch bracket.

The present invention relates to an antenna mast construction of the type which may be readily carried and erected by one man.

In many applications, in remote locations, it is necessary to assemble a mast upon which a transmitting or receiving antenna can be mounted. These masts may be used temporarily or, in some cases, on a semi-permanent basis. It is obvious that insofar as mobility is concerned, such masts should be highly portable and easy to assemble, yet of sturdy and reliable construction. In some situations, where it is not possible to first assemble the mast on the ground and pivot it to an upright position, it is necessary to vertically "launch" the mast, that is, to assemble it vertically, to its desired height which, typically, is many times the height of an individual. Prior devices designed for this purpose are generally of a complex nature and include, for example, windlass arrangements, telescoping tube sections of increasing diameter, etc. Consequently such prior art devices were both expensive and time-consuming to launch.

The present invention provides an antenna mast of simple construction involving no moving parts, which can be used by a single individual to vertically launch an antenna mast. The mast construction, according to the invention, is lightweight and can be carried by a single man. When erected, it provides a solid foundation for an antenna or the like, and is capable of any desired degree of azimuthal adjustment without removal of the main mast guy lines. In addition, all of the mast sections are of the same construction lending to ease and economy of fabrication.

Briefly, in accordance with the invention, a mast includes a baseplate and mast section to which a launch attachment is mounted. The launch attachment includes a cylindrical housing which mates with the bottoms mast section and a launching section extending away from the housing. Additional mast sections are inserted through the bottom of the launching section and held therein by a simple slot and key locking mechanism. Successive mast sections are locked together in essentially the same way, with the addition of each such section increasing the mast height to vertically "launch" the mast.

The construction and operation of the invention is described in further detail below with reference to the attached drawings, wherein:

FIG. 1 is a perspective view of an erected mast according to the invention;

FIG. 2 is a top sectional view along the line 2—2 of FIG. 1;

FIG. 3 is a detailed front view, partially in section, of a portion of the base plate and the bottom of the lowermost mast section;

FIG. 4 is a front view, shown partially broken away, showing the uppermost mast section inserted through the vertical launch attachment with a guy ring and guy lines in place;

FIG. 5 is a sectional view along the line 5—5 of FIG. 4;

FIG. 6 is a side view partially in section showing the slot and key mechanism by which adjacent mast sections are secured to each other; and

FIG. 7 is a perspective view of the launch attachment in accordance with the present invention.

Referring to the drawings, a mast construction according to the invention comprises a base plate **8**, of any desired shape, a lowermost tubular mast section **10***a* extending from base plate **8**, a vertical launch attachment **12** supported on the top of mast section **10***a*, and a number of additional tubular mast sections, here illustratively shown as three sections **10***b*, **10***c* and **10***d* extending from the launch attachment **12**. The mast sections **10** may be made of a metal such as aluminum or a dielectric material such as fiberglass. The base plate **8** and launch attachment **12** are also of a suitable material, such as metal.

When the complete mast is erected, the mast sections **10***b*, **10***c* ad **10***d* are fitted together as shown. Each mast section is identical and includes an upper integral reduced diameter portion **16** (or tubular sleeve) secured to its interior surface, and protruding from the top of the mast section so as to be capable of fitting within the bottom of any of the other mast sections **10**. A slot **18** (FIG. 6) is formed in the top of the reduced diameter section **16** and is adapted to retain an internal key **20** which extends diametrically across the bottom of an upper adjacent mast section **10**. An external key **22** is located on a mast section at a point, for example, about one-quarter to one-third of the section height up from the bottom in the major diameter portion. The key **22** of each section is fixed thereto and extends from the exterior surface of the mast section for retention of that section within the vertical launch attachment **12** as described below. Where any of the foregoing portions of a particular mast section **10***a*, **10***b*, **10***c* or **10***d* are described below, the letters *a*, *b*, *c* or *d* are used to identify the corresponding mast section.

The bottom of the lowermost mast section **10***a* is supported on a rod **30** which is pivotally mounted on an axle **32** journalled in lugs **34** and **36** extending upwardly from base plate **8** (FIG. 3). The mast section **10***a* is supported on a shoulder **37** formed in rod **30**. A thumb screw **42** is received in a threaded hole **43** in rod **30**. Screw **42** can be threaded in to hole **43** so that the inner portion **45** of its head bears on the outer surface of the mast section **10***a* to fix the azimuthal position of mast section **10***a* to the rod **30**. The base plate **8** may be secured to the ground by any suitable means such as stakes **46** which include finger clamps **48** adapted to fit into holes **50** on the base plate **8**.

The vertical launch attachment **12** includes a tubular housing **52** (FIGS. 1, 2 and 4) to which a launching section **54** may be riveted as shown at **56**. Alternatively, housing **52** and section **54** may be integrally formed by forging or extrusion. The housing **52** includes a locking key **57** and the bracket **54** includes a slot **58** which is adapted to receive the key **22** of the mast section **10***b*, *c* or *d*. The reduced diameter portion **16***a* of mast section **10***a* is received in the bottom of housing **52** and secured therein by retention of key **57** in slot **26**. The interior of launching section **54** may be lined with a plastic bearing material to reduce friction.

Three guy lines **62** terminating in clips **64** are attached to suitable apertures (not numbered) in the launching section **54** of launch attachment **12** to stabilize the lower portion of the mast. The guy lines **62** are inserted through the eyes of stakes **66** and secured by rope clamps **68** which enable the length of guy lines **62** to be adjusted as needed. These additional guy lines **70** may be coupled to a guy ring **72** which rests on a retainer **74** (FIG. 4) to provide additional rigidity in the erected condition. The retainer **74** and the guy ring **72** are intended to be inserted on a mast section **10** at the time of its erection. The ring **72** and retainer **74** may be split so that they can be opened and conveniently installed on a mast section by inserting pins **75** of retainer **74** into suitable apertures (not numbered) in the adjacent mast section **10**. As many mast sections as desired may be equipped with a guy ring and retainer. Each of the guy lines **70** has a standard releasable chip **76** attached to one of its ends. The clips are inserted in suitable apertures (not numbered) in the guy ring **72**. The other ends of the guy lines **70** are inserted through the eyes of stakes **66** and retained by adjustable rope clamps **80** identical to clamps **68**.

The mast of the present invention is erected in the following manner. After the base plate **8** is suitably secured to the ground by the stakes **46**, the mast section **10***a* is mounted on rod **30** and pivoted to a vertical position about axle **32** and the vertical launch attachment **12** secured thereto by inserting the reduced diameter portion **16***a* of mast section **10***a* into the larger diameter tubular housing **52**. The housing **52** is locked into position by inserting its key **57** into slot **18***a* of mast section **10***a*. The guy lines **62** are then attached and the length thereof adjusted by means of the rope clamp **68** to provide a tripod which supports the mast section **10***a* and launch attachment **12** in a vertical position.

The next step is to insert the mast section which is to be the uppermost mast section (section **10***d* in the present example) through the bottom of the bracket **54**. For this purpose section **10***d* must be turned so that the key **22***d* can pass within the launching section **54** as shown in FIG. 2. Mast section **10***d* is then pushed up until its key **22***d* clears launching section **54** and allowed to drop back so it is locked into section **54** by inserting its key **22***d* into slot **58**. At this time a small portion of the section **10***d* extends below bracket **54**. The guy retainer **74** and ring **72** may then be attached to mast section **10***d*. (As should be apparent, each mast section **10** must be of approximately the same size as the distance from the base plate **8** to the bottom of the mast section **10** held in bracket **54**.) Clips **76** are attached to the guy ring **72** and the antenna (not shown) may be mounted on the top of the mast section **10***d*.

The next step is to insert the reduced diameter top **16***c* of the next mast section **10***c* into the bottom of the mast section **10***d* extending from the bottom of the section **54**. The mast sections **10***d* and **10***c* are locked together by insertion of the key **20***d* of mast section **10***d* into slot **18***c* of mast section **10***c*. The two joined mast sections are then pushed upwardly through the section **54**. This removes key **22***d* from slot **58**. Key **22***c* is then inserted into slot **58** to support the two sections of the mast. The third mast section **10***b* is added in the same way, that is, by joining it to mast section **10***c* and pushing upwardly and then letting the key **22***b* rest in slot **58**. Finally, the guy lines **70** are suitably tightened by adjusting the rope clamps **80**.

Once the mast has been erected, it may be adjusted in azimuth by disconnecting guy lines **62**, and loosening the thumb screw **42**. The mast is then rotated on rod **30** until it is pointing in the desired direction. The thumb screw **42** is then tightened and the guy lines **62** re-attached, if desired. Since the guy ring **72** can rotate on the mast section **10***d*, there is no need to adjust the guy lines **70** which stabilize the upper portion of the mast and which, under normal conditions, would be out of reach of the user.

Although the invention has its principal utility with respect to the direct vertical launching of an antenna mast, the construction described and illustrated herein can also be used to erect a mast first on the ground in the manner described and thereafter raise it to a vertical position by pivoting it about the axle **32**.

Thus, the invention provides a relatively inexpensive mast construction which can be used with ease to raise a mast vertically without any complex mechanical mechanisms. Moreover, the construction of the invention has advantages with respect to portability and manufacturing in that it may be stored in a package no longer than the length of the individual mast sections and all of its parts may be fabricated with relative ease.

Various modifications of the invention will be obvious to those skilled in the art and the invention therefore, should be defined with reference to the attached claims.

What is claimed:

1. A mast construction comprising a base, a first mast section mounted on the base and a launch attachment secured to the upper end of said section, said launch attachment comprising a first portion secured to the said section and a second portion laterally of said first portion defining a through opening in parallel offset relation to said first mast section, a slot in said second portion, a second mast section comprising an elongated tube mounted in said second portion, key means on said tube inserted in the slot for supporting the tube in said second portion, and a series of tube joined end to end mounted on the second mast section, each tube being of the same external diameter as the second mast section and of a length less than the distance between the base and second portion whereby the tubes can be assembled by insertion through said through opening.

2. A mast construction as defined in claim **1** wherein the tubes are joined by means comprising a reduced diameter segment of one tube inserted in the adjacent tube and a key mounted within the said adjacent tube extending into a slotted portion in the said one tube.

3. A mast construction as defined in claim **2** further including a key means on each tube of a size to be insertable in said slot in said second section.

4. A mast construction as defined in claim **2** further including means in said launching section for connection with guy lines whereby to stabilize the lower portion of the mast and means secured to at least one of the tubes of the series for connection with guy lines to stabilize the upper portion of the mast.

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U.S. Cl. X.R.

52—116, 726