July 31, 1962 C. R. PARMENTER ETAL 3,047,107

TELESCOPING TOWER

Filed Nov. 25, 1957 3 Sheets-Sheet 1

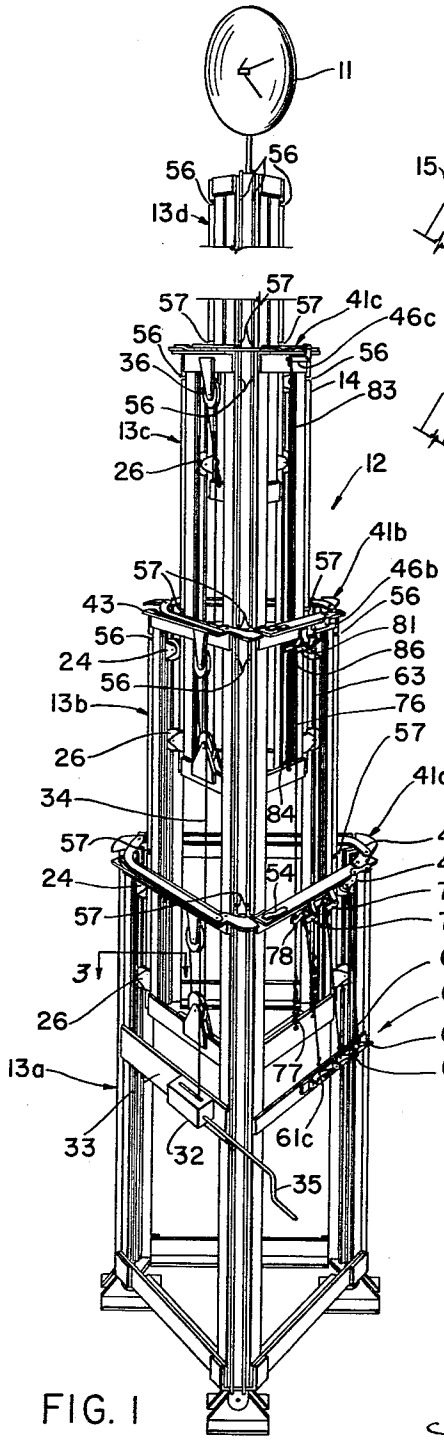


FIG. 1

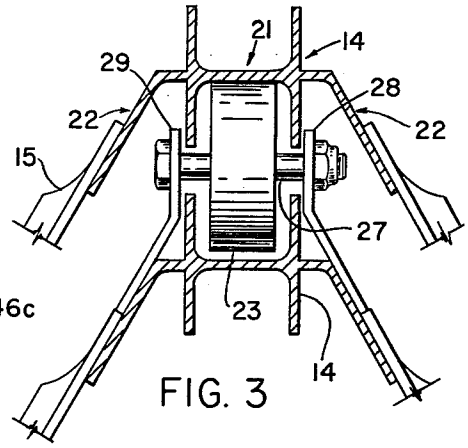


FIG. 3

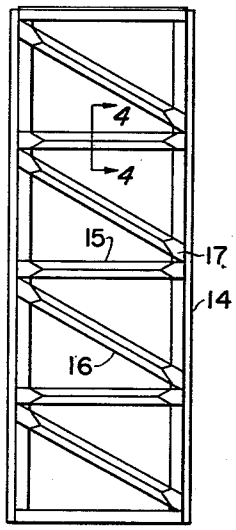


FIG. 2



FIG. 4

CHARLES R. PARMENTER
AND
ROBERT V. LAUSTRUP
INVENTORS

BY
Fleht and Swain
ATTORNEYS

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TELESCOPING TOWER

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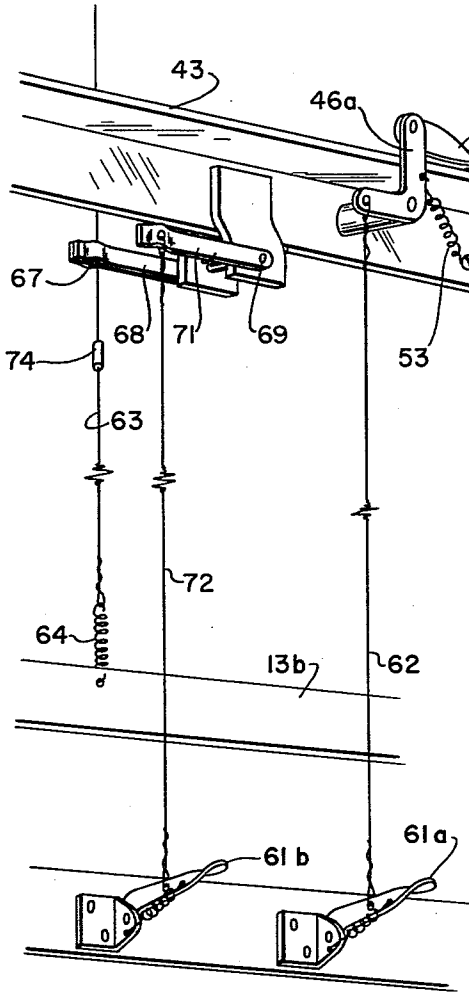


FIG. 5

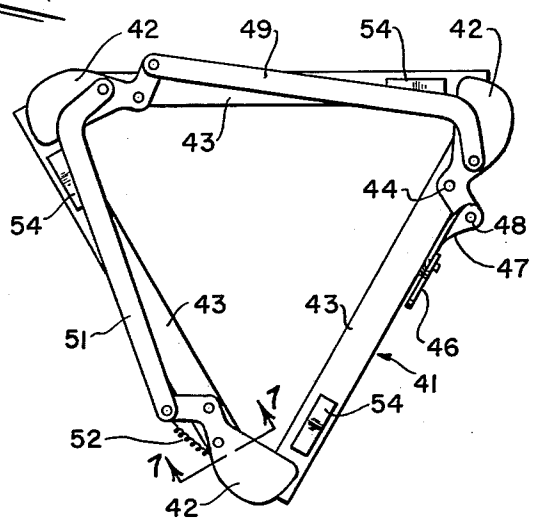


FIG. 6

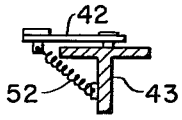


FIG. 7

CHARLES R. PARMENTER
AND
ROBERT V. LAUSTRUP
INVENTORS

BY
Fleck and Swain
ATTORNEYS

July 31, 1962 C. R. PARMENTER ETAL 3,047,107

TELESCOPING TOWER

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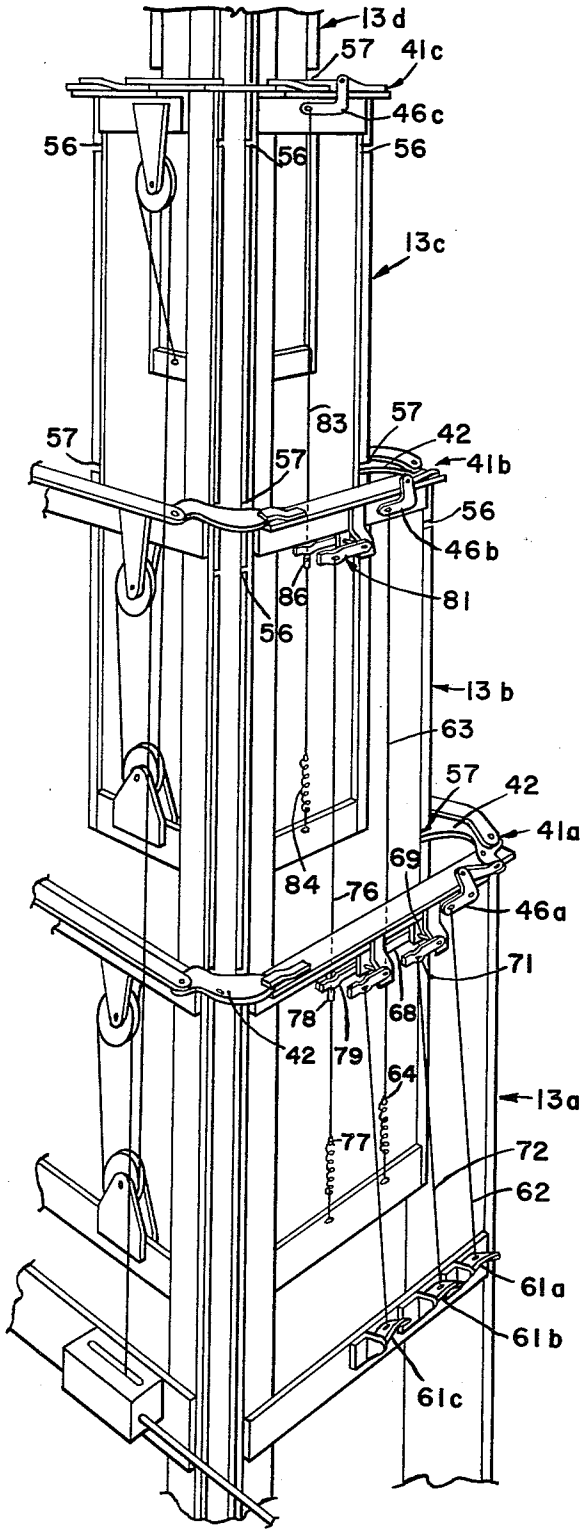


FIG. 8

INVENTORS
CHARLES R. PARMENTER
ROBERT V. LAUSTRUP
Flehr & Swain
ATTORNEYS

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TELESCOPING TOWER

Charles R. Parmenter, Belmont, and Robert V. Laustrup, Woodside, Calif., assignors to Alpar Manufacturing Company, Redwood City, Calif., a corporation of California

Filed Nov. 25, 1957, Ser. No. 698,561
6 Claims. (Cl. 189—14)

This invention relates generally to telescoping towers, and more particularly to telescoping towers of the type in which the various sections can only be extended in fixed order.

Telescoping towers are often employed for survey work, for example, by television installers, public utility service companies, and government agencies, where it is necessary to place an antenna at various heights. In general, several men are required to guy a tower as it is erected for a survey. It is apparent that the greater the number of persons required, the greater the cost of a survey. The time and personnel required to erect a tower are of great importance where the tower is used to establish emergency communication, for example, for fire fighting, disaster situations and civil defense operations.

In our copending application entitled "Telescoping Tower," Serial No. 511,568, filed May 27, 1955, now Patent No. 2,942,700 of which this application is a continuation-in-part, there is described a telescoping tower in which a plurality of sections are releasably locked in their telescoped and extended positions. Suitable means is provided at the base of the tower for selectively releasing the locking means.

It is a general object of the present invention to provide an improved telescoping tower.

It is another object of the present invention to provide a telescoping tower in which the sections can only be released from the outer sections inwardly.

It is another object of the present invention to provide an improved locking means which serves to lock at each of the vertical support members of the tower.

It is a further object of the present invention to provide a telescoping tower in which each section may be guyed individually and secured as it is extended, allowing erection of the tower with less personnel and in adverse weather conditions.

These and other objects of the invention will become more clearly apparent from the following description when read in conjunction with the accompanying drawing.

Referring to the drawing:

FIGURE 1 is an elevational view in perspective of a tower incorporating the present invention;

FIGURE 2 is a side elevational view illustrating the lattice work employed in each tower section;

FIGURE 3 is a sectional view taken along the line 3—3 of FIGURE 1;

FIGURE 4 is a sectional view taken along the line 4—4 of FIGURE 2;

FIGURE 5 is a schematic view illustrating the lock release mechanism;

FIGURE 6 is an elevational view showing the locking means;

FIGURE 7 is a sectional view taken along the line 7—7; and

FIGURE 8 is a simplified elevational view in perspective illustrating the lock release mechanism.

Generally, the tower comprises a plurality of tower sections adapted to be telescoped one within another. Suitable means are provided for extending the various sections. Locking means are carried at the top of each of the sections except the innermost to lock adjacent inner sections in telescoped and extended positions. Suitable means are provided at the base of the tower for releasing the locking means whereby the sections may be extended and telescoped. The means for releasing the locking means are so designed that it is impossible to improperly extend the tower.

Referring generally to FIGURE 1, a dish antenna **11** is shown supported by a tower designated generally by the reference numeral **12**. The tower comprises a plurality of telescoping sections **13** (**13***a–d*). These sections are designed to incorporate sound structural engineering principles. For example, the tower shown is triangular in section. The upright members **14**, to be presently described in detail, are reinforced by a lattice work of cross members **15** and diagonal members **16**. The members **15** and **16** may be made of angle material which is flattened at the ends **17** and suitably secured to the upright members **14**, as for example by welding (FIGURES 2 and 4).

The lattice work of cross members **15** and diagonal members **16** is not illustrated in FIGURE 1 since it would overly complicate the drawing and emasculate the invention. The vertical members **14** are extruded members of the type more clearly shown in section, FIGURE 3. The members **14** include an H-shaped center portion **21** with depending side portions **22**. The portions **22** have an included angle of 120° for the triangular tower shown

The vertical members **14** are continuously guided one within the other by means of rollers **23** which may, for example, be nylon. The rollers **23** are mounted at the top of the vertical members facing inwardly **24** and at the bottom of the vertical members facing outwardly **26**. The rollers **23** are carried on a shaft **27** which is suitably journalled between the plates **28** and **29** secured to the outwardly extending H portions of the extruded sections, as for example by welding.

Suitable means are provided for extending the tower. For example, the means may comprise a hydraulic lift or windlass. A worm-type windlass **32** is shown mounted on the bracket **33**. The cable **34** engages the windlass **32** and passes over a plurality of pulleys **36**. By operating the windlass, the cable serves to urge the various pulleys **36** together thereby raising the associated sections of tower. In a worm gear windlass, the friction between the gear which drives the drum and the worm drive prevents rotation of the drum when the crank **35** is released.

At the top of each section with the exception of the innermost section, suitable locking means **41** (**41***a–c*) are provided (FIGURES 1, 6 and 8). The locking means **41** for each of the sections are identical, and, therefore, the locking means for only one section will be described. The locking means is more clearly illustrated in FIGURES 5 and 6. The locking means comprises locking members **42** disposed at each of the corners of the tower section and carried on the T-shaped cross members **43** secured to the top of each tower section. The members **42** are pivoted at **44** whereby they may be rotated into engagement with the next inner tower section, as will be presently described. One of the members **42** is adapted to be rotated by means of a crank **46** (FIGURE 5) which engages one end of the link **47**. The other end of the link **47** is pivotably attached **48** to the locking member **42**. Thus, by counterclockwise rotation of the crank **46**, the locking member **42** is pivoted outwardly. Links **49** and **51** have their ends pivotably engaged with adjacent locking members **42** as illustrated. Thus, when the one member **42** is rotated, the links **49** and **51** serve to pivot the other two locking members **42** outwardly out of engagement with the next inner adjacent tower section. The locking members **42** are urged into the locked position by means of a coil spring **52** attached between one of the members **42** and the support **43**, previously described. If desired, a spring may

be associated with more than one of the locking members **42** to give the desired torque. A coil spring **53** may be employed in conjunction with the crank **46** to urge the same in a direction to maintain the members **42** in the locked position. In their locked position, the members **42** ride under the retaining plates **54**. With the locking members **42** in the locked position, they are urged inwardly and engage one of the slots **56** or **57** (FIGURES 1 and 8) of the next adjacent inner section. When in engagement with the slot **57**, the adjacent tower section is locked in its extended position, while if the member **42** is in engagement with the slot **56**, the tower section is locked in its telescoped position.

Referring to FIGURES 1, 5, and 8, the means for rotating the cranks **46** to release the locking members at each of the tower sections is illustrated. The means for rotating the cranks **46** and thereby selectively unlocking the members **42** is operable from the base of the tower. Means are provided to assure that the tower will be extended from the outer sections inwardly. A plurality of release levers designated generally by reference numerals **61** (**61***a*–**61***c*) are located at the base of the tower. The lever **61***a* is connected to a cable **62** which has its other end connected to the crank arm **46***a* which is carried at the top of the tower section **13***a*. Thus, by pulling the lever **61***a* downwardly, the crank is rotated counterclockwise to release the locking members **42***a* and allow the inner tower sections **13***b*–**13***d* to be extended.

The second tower section **13***b* is provided with a cable **63** which is spring loaded **64** at one end and which has its other end attached to the crank arm **46***b*. The cable **63** extends through the opening **67** (FIGURE 5) formed in the lever **68**, which is attached to a shaft **69**. A lever **71** is attached to the other end of the shaft. The lever **71** is moved by the lever **61***b* at the base of the tower through the cable **72**. Therefore, by urging the lever **61***b* downwardly, the levers **68** and **71** are urged downwardly. When the tower section **13***b* is in its telescoped position, the stop **74** (FIGURE 5) which is near the bottom of the tower section is away from the lever **68**. Therefore, by urging the lever **61***b* downwardly, the lever **68** does not move the cable **63**. However, the stop **74** is so located that when the tower section **13***b* is locked in its extended position, the stop **74** is adjacent to the lower surface of the lever **68**. In this condition, by urging the lever **61***b* downwardly, the cable **63** is moved downwardly thereby rotating the crank **46***b* to release the locking mechanism **41***b* which serves to hold the tower section **13***c*. The tower section **13***c* may then be elevated.

Referring to FIGURE 8, locking and release of section **13***d* is similar to that of **13***c*, with some minor variations. The section **13***b* carries a cable **76** which is spring-loaded **77** and has a stop **78** which abuts against the lever **79** when the tower section **13***b* is extended. The other end of the cable **76** is attached to one of the lever arms of the lever assembly **81**. The levers of the lever assembly **81** rotate in unison as previously described for the assembly comprising arms **68**, **71**. The tower section **13***c* carries a cable **83** which is spring-loaded **84** at one end and has its other end attached to the crank arm **46***c*. Thus, when the tower section **13***c* is extended and locked, an abutment **86** on the cable **83** abuts against the lever **81**. At this time, pulling the lever **61***c* downward turns the lever **79**, pulling the cable **76** downwardly to pivot the lever **81** which engages the abutment **86** and pulls the cable **83** downwardly to rotate the crank arm **46***c* to release locking means **41***c* and the tower section **13***d*.

It is noted that unless the next adjacent inner tower section is elevated, none of the other sections may be released. For example, assuming that the tower is collapsed, then by pulling the lever **61***b*, the tower section **13***c* will not be released since the arm **68** will not abut against the stop **74** (FIGURE 5) to release the associated locking mechanism **41***b*. Similarly, for the section **13***d*, the abutments are not in the correct position.

Thus it is seen that it is impossible to elevate the tower except in the order of **13***b*, **13***c*, **13***d*, etc., that is, from the outermost section inwardly to the innermost section. The tower must be collapsed in reverse order.

Thus it is seen that we have provided an improved telescoping tower. Particularly, the tower includes novel locking means which permit extending and telescoping the tower sections in a fixed order, outer sections inwardly to the innermost section. The tower sections are continuously guided as they are moved one within the other. The locking means serves to lock each of the upright members thereby providing a rigid tower.

We claim:

1. A telescoping tower comprising a plurality of sections adapted to be telescoped one within the other, locking means carried at the top of each of said sections with the exception of the innermost section, said locking means adapted to lock adjacent inner sections in their telescoped and extended positions, and means operable at the base of the tower for selectively releasing said locking means, said last named means including means for preventing the release of the locking means of the sections other than the next innermost telescoped section whereby the tower is extended from the outermost sections inwardly.

2. A telescoping tower comprising a first, second and at least a third section adapted to telescope one within the other, locking means carried at the top of each of said sections with the exception of the innermost section, said locking means adapted to lock adjacent inner sections in their telescoped and extended positions, and means operable at the base of the tower for selectively releasing said locking means, said last named means including means for preventing the unlocking of the third section until the second section has been extended.

3. A telescoping tower comprising first, second, third and at least a fourth section adapted to telescope one within the other, locking means carried at the top of each of said sections with the exception of the innermost section, said locking means adapted to lock adjacent inner sections in the telescoped and extended positions, and means operable at the base of the tower for selectively releasing said locking means, said last named means including means for preventing the unlocking of the third and fourth sections until the second section has been extended, and for preventing the unlocking of the fourth section until the third section has been extended.

4. A telescoping tower comprising a plurality of sections adapted to be telescoped one within the other, each of said sections including three upright spaced members, locking means carried at the top of each of said sections with the exception of the innermost section, said locking means adapted to lock adjacent inner sections at each of the upright members, and means operable at the base of the tower for selectively releasing said locking means, said last named means including means for preventing the unlocking of telescoped sections other than the next innermost section whereby the tower is extended from the outermost sections inwardly.

5. A telescoping tower comprising first, second, third and at least a fourth section adapted to be telescoped one within the other, each of said sections including three upright spaced members, locking means carried at the top of each of said sections with the exception of the innermost section, said locking means adapted to lock adjacent inner sections at each of the upright members, and means operable at the base of the tower for selectively releasing said locking means, said last named means including means for preventing the unlocking of the third and fourth sections until the second section has been extended and for preventing unlocking of the fourth section until the third section has been extended.

6. A telescoping tower comprising first, second, third and at least a fourth section adapted to be telescoped one within the other, each of said sections including three upright spaced members, locking means carried at the

top of each of said sections with the exception of the innermost section, said locking means adapted to lock adjacent inner sections at each of the upright members, and means operable at the base of the tower for selectively releasing said locking means, said last named means including means for preventing unlocking of the third and fourth sections until the second section has been extended and for preventing unlocking of the fourth section until the third section has been extended, each of said upright members in section including an H shaped center portion with depending side portions having an included angle of 120°, and means cooperating with said H shaped portions serving to guide each of the tower sections one within the other.

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